

# *The Morse Twist Drill and Machine Co ...*

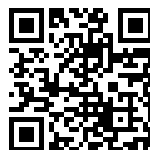
Morse Twist Drill & Machine Co.,  
New Bedford, Mass

---

This is a reproduction of a library book that was digitized by Google as part of an ongoing effort to preserve the information in books and make it universally accessible.

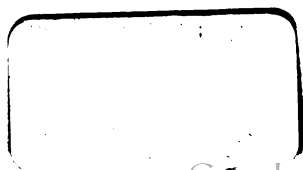
Google™ books

<https://books.google.com>





D 44358

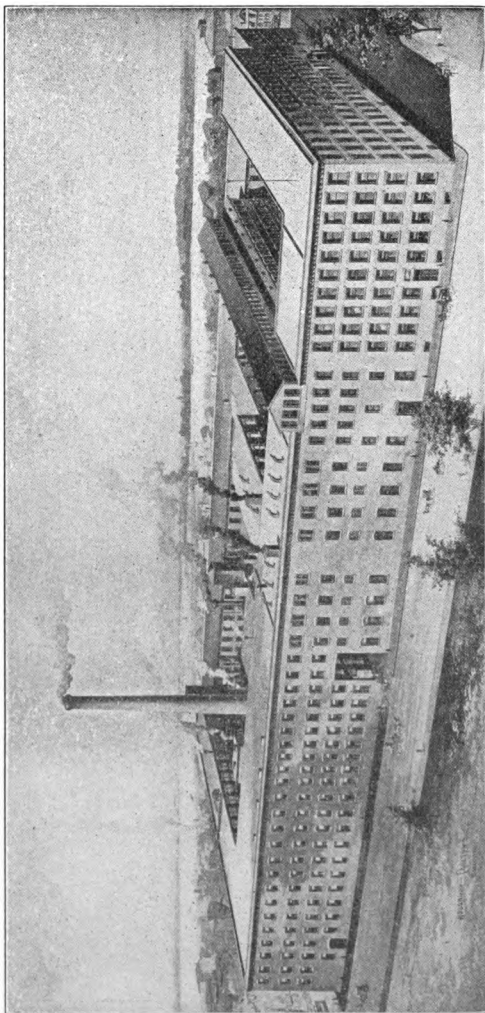












**WORKS OF THE MORSE TWIST DRILL & MACHINE COMPANY,  
NEW BEDFORD, MASS., U. S. A.**

**THE**  
**MORSE TWIST DRILL AND**  
**MACHINE CO.**

---

**MAKERS OF**

**INCREASE AND CONSTANT  
ANGLE TWIST DRILLS  
REAMERS, CHUCKS, MILLING  
CUTTERS, TAPS, DIES  
M A C H I N E R Y A N D  
M A C H I N I S T S ' T O O L S**

---

**NEW BEDFORD, MASS.**

**U. S. A.**

---

**1 9 1 2**

**COPYRIGHTED BY  
MORSE TWIST DRILL & MACHINE CO**

KD 44358



GRIFFITH-STILLINGS PRESS, BOSTON

**W**E take pleasure in presenting to our customers the largest and most complete catalogue ever issued by us, and trust it will be found an excellent book for reference to the various lines we manufacture.

The success of the *Twentieth Century Drill* still continues. Both body and shank are ground on centers after hardening, insuring its running true and accurate to size. The large amount of radial clearance lessens to a great degree the friction of the drill in the hole.

Other features illustrated in the catalogue we think will be advantageous to our customers. Among the new tools illustrated are:

No. 4 Drill Case.

Short Shank Sockets and Sleeves.

Tang Gauge.

Sleeves with Clutch Drive.

Solid Collets.

Floating Collets.

Reamer Drills.

Drills with Grooved Shanks.

Millimeter sizes of Bit Stock and Ratchet Drills.

Track Drills.

Screw Shank Machine Bits.

Revolving Drill Stand.

Folding or Portable Drill Holders.

Chucks with Geared Adjustment.

Solid and Floating Arbors.

Morse Taper Reamers with Morse Taper Shanks.

Morse Taper Reamers with Taper Square Shank Fitting Ratchet.

Taper Reamers of B. & S. Taper.

Millimeter Sizes of Jobbers', Shell and Adjustable Reamers.

Expanding Reamers with Morse Taper Shanks.

Shell Reamers, Shell Drills and Expanding Shell Reamers  
with Straight Holes.

New Style Adjustable Reamers.

Taper Reamers with Straight Shanks.

Half Round Taper Pin Reamers.

Taper Pin Reamers with Morse Taper Shanks.

Floating Reamers both Solid and Expanding.

Four Grooved Chucking Reamers.

Combined Drills and Countersinks with Bodies  $\frac{1}{2}$  and  $\frac{5}{8}$  diameter.

Millimeter and Letter Size Drill Gauges.

Sets of Counterbores, Taps and Drills.

Straight Shank End Mills.

Formed Cutters for Copper

Sprocket Wheel Cutters for Roller Chain.

One Lock Adjustable Reamers.

Pipe Hob Taps.

Spindle Stay Bolt Taps.

Mud Plug Taps.

Boiler Taps.

Bit Brace Taps.

Combined Taps and Drills.

MORSE TWIST DRILL & MACHINE CO.

# INDEX.

ARBORS	NUMBER	PAGE
with Blank Ends.....	125C.....	155
for Drill Chucks.....	125, 125½, 125G.....	152-155
for Expanding and Adjustable Shell		
Reamers.....	125E, 125F, 125P.....	156-243
for Face Milling Cutters with Inserted		
Teeth.....	125D.....	155
Floating, for Shell Reamers and Shell		
Drills with Straight Holes.....	125K.....	157
Floating, for Shell Reamers and Shell		
Drills with Taper Holes.....	125L.....	158
for Screw Slotting Cutters.....	125J.....	157
for Shell End Mills.....	125B, 125½B.....	154
for Shell Reamers and Shell Drills.....	<div> <div>125A, 125½A.....</div> <div>125H, 125K, 125L.....</div> <div>125M, 125N.....</div> </div>	153-159
Solid, for Shell Reamers and Shell Drills		
with Straight Holes.....	125M, 125N.....	159
CENTER KEYS FOR SOCKETS AND		
SLEEVES.....	100C.....	7
CHUCKS		
Beach.....	121.....	160
Center Drill.....	124.....	162
Stetson.....	122, 122C.....	161-162
Chuck Jaws.....	121½.....	160
COUNTERBORES		
with Interchangeable Blades and Guides.....	109F.....	247
for Machine Screw Heads.....	109J.....	246
for Machine Screws, Morse Taper Shanks.....	109D, 109K.....	246-248
for Machine Screws, Straight Shanks.....	109L.....	249
Sets in Blocks.....		250-251-252
Solid and Adjustable, for Wood.....	108K, 108L, 108M.....	67
Taper Shank.....	109D, 109K.....	246-248
COUNTERSINKS		
Bit Stock.....	109A.....	244
and Drills Combined.....	109B, 109½B, 109C.....	244-245
CUPS FOR USE IN OIL DRILLS.....		115
CUTTERS (SEE MILLS)		
Angular.....	126A, 126S, 126T.....	273-282
Angular, with Side Ground Concave.....	126R.....	282
Angular, for Spiral Mills.....	126D, 126K.....	277-278
Concave and Convex.....	126C.....	277
Corner Rounding.....	126N.....	280
with Double Angle.....	126S, 126T.....	282
Face Milling with Inserted Teeth.....	126Y, 126Z.....	270-286
Formed.....	126I.....	268-270
Formed, with Double Angle.....	126T.....	282
Gangs of.....	126½K, 126X.....	269-270
Gear.....		296-306



---

MORSE TWIST DRILL AND MACHINE COMPANY.

---

CUTTERS (continued)	NUMBER	PAGE
for Grooving Reamers.....	126H-A.....	307
for Grooving Taps.....	126H.....	307
for Grooving Taps and Reamers.....	126H-B, 126H-C.....	308
Heading Mills or Side Milling.....	126B, 126J.....	274-278
Interlocking.....	126G.....	275
Involute, for Teeth of Gear Wheels.....	{ 131B, 131H, ..... 300-301 131J, 131K, ..... 302 131L, 131M, ..... 303	
Involute Gear, Circular Pitch.....	131N.....	304
Milling.....	126, 126L.....	271-272-276
for Mitre and Bevel Gears.....	131C.....	305
with Radial Grooves.....	126L.....	276
Screw Slotting.....	131.....	283-284
Side Milling or Heading Mills.....	126B.....	274
Side Milling, with Inserted Teeth.....	126J.....	278
Slitting Saws.....	132, 132A.....	273-285
for Spiral Mills.....	126D, 126K.....	277-278
Sprocket Wheel, for Block Center Chains 1" Pitch.....	126M.....	279
Sprocket Wheel for Block Center Chains, Circular Pitch.....		279
Sprocket Wheel, for Roller Chain.....	126M-A.....	279
Stocking, for Involute Gears.....	{ 131A, ..... 297 131D, 131E ..... 298 131F, 131G ..... 299	
T Slot.....	126V, 126W.....	294
<b>DIES</b>		
Machine or Solid Bolt.....	161.....	338
Screw Plate.....	152.....	334
Solid, for Boynton & Plummer's Bolt Cutters.....	160.....	338
Solid Pipe.....	159.....	337
<b>DISKS, STANDARD REFERENCE.....</b>	128B.....	266
<b>DRILLS</b>		
Bit Point, Morse Taper Shanks.....	108B.....	65
Bit Point, fitting Prybil Machines.....	108T.....	68
Bit Point, 1-2" Shanks fitting Prentice Drill Press.....	108A.....	64
Bit Point, with Solid and Adjustable Counterbores.....	108K, 108L, 108M.....	67
Bit Point, Straight Shanks.....	108.....	63
Bit Stock.....	109.....	69-70
Bit Stock, M. M. Sizes.....	109½.....	71-72
fitting Blacksmiths' Drill Presses.....	110, 111, 112.....	80-85
Center.....	114E, 114F.....	92
Center, M. M. Sizes.....	114G.....	93
for Clutch Drive.....		11
fitting Coe's Drill Press.....	110.....	80-81
combined with Pipe Taps.....	133, 133A.....	311-312

DRILLS (continued)	NUMBER	PAGE
Four-Groove, Morse Taper Shanks	102G	104-107
Four-Groove, Straight Shanks	104H	108-111
with Grooved Shanks, for Andrew's Sockets	102J	13
with Grooved Shanks, Jobbers' Lengths fitting Two-Jawed Chucks	105B	55
with Grooved Shanks, Taper Lengths fitting Two-Jawed Chucks	104M	43-48
Hollow, for Deep Drilling or Long Holes	114D	144
Hollow, Use of		116
Jewelers', Fractional Sizes	107C	61
Jewelers', Wire Sizes	107B	60-61
Left Hand		62
MACHINE BITS FOR WOOD		63-68
{ Screw Shank, fitting Prybil Machines	108T	68
{ Single Groove	{ 108P, 108R 108S	{ 68
{ Special Points	{ 108C, 108D 108E, 108F 108G	{ 66
Morse Taper	102	14-21
Morse Taper (Shanks larger than regular)	102	22-23
Morse Taper, M.M. Sizes	102E	24-29
with Oil Holes, Morse Taper Shanks	102A, 102B, 102C	118-129
with Oil Holes, for Screw or Chucking Machines	104E	136-137
with Oil Holes, for Screw or Chucking Machines, M.M. Sizes	104L	141-143
with Oil Holes, Special Lengths	102D, 104C	115
with Oil Holes, Straight Shanks	{ 104A, 104B, 104D, 104E	{ 130-133 134-137
with Oil Holes, Straight Shanks, M.M. Sizes	104K, 104L	138-143
with Oil Holes, Use of		116-117
Paper	108J	66
Pod	108H	66
fitting Prentice Drill Press, 1-2" Shank, Taper Length	111	82-83
Presses, Manufacturers of		79
Reamer, Morse Taper Shanks	102J	30
Reamer, Straight Shanks, Taper Length	104N	49
Routing Bits	108N	67
Screw Shank Machine Bits	108T	68
IN SETS		145-151
{ Bit Point		148-150
{ Bit Stock		148-150
{ Jewelers		146
{ Morse Taper Shanks		145-146
{ Straight Shanks		146-151

DRILLS (CONTINUED)	NUMBER	PAGE
Shell.....	102H.....	112-113
Shell, with Straight Holes.....	102½H.....	114
fitting Silver & Deming's Press, Short Length.....	112.....	84-85
Single Groove.....		68
Straight Shank, Grooved Shanks, Job- bers' Length.....	105B.....	55
Straight Shank, Grooved Shanks, Taper Length.....	104M.....	43-48
Straight Shank Jewelers.....	107B, 107C.....	60-61
Straight Shank, Jobbers' Length.....	105.....	50
Straight Shank, Jobbers' Length, M.M. Sizes.....	105A.....	51-54
Straight Shank, Letter Sizes.....	106.....	56
Straight Shank, Taper Length.....	104.....	31-37
Straight Shank, Taper Length, M.M. Sizes.....	104F.....	38-42
Straight Shank, Wire Sizes.....	107.....	57-59
Straight Shank, Wire Sizes for Jewelers.....	107B.....	60-61
Straightway, Morse Taper Shanks.....	114B.....	87-89
Straightway, Straight Shanks, Jobbers' Length.....	114A.....	86
Straightway, Straight Shanks, Taper Length.....	114½B.....	90-91
Straightway, Straight Shanks, Wire Sizes.....	114C.....	91
Taper Square Shank, Style No. 1.....	109E.....	73
Taper Square Shank, Style No. 2.....	109E.....	74
Taper Square Shank, M.M. Sizes, Style No. 1.....	109½E.....	75-76
Taper Square Shank, M.M. Sizes, Style No. 2.....	109½E.....	77-78
Three-Groove, Morse Taper Shanks.....	102F.....	94-98
Three-Groove, Straight Shanks.....	104G.....	99-103
Track.....	105C.....	93
<b>DRILL CASES</b>		
Nos. 1, 2, 3, 4.....		1-5
Indexed.....		149-150
Sectional Cases (Boxes).....		1
<b>DRILL PRESS MANUFACTURERS</b>		79
<b>DRILL STANDS AND HOLDERS</b>		
Blocks.....		147
Folding or Portable Drill Holder.....		151
Indexed Cases.....		149-150
Revolving Drill Stand.....		145
<b>GAUGES</b>		
Adjustable Caliper.....	128A.....	265
Morse Taper.....	128C.....	267
Plug and Ring.....	128.....	263-264
Sets.....	128A, 128B.....	265-266
Standard Reference Disks.....	128B.....	266
Tang, for Short Shank Sockets.....		11
Twist Drill, Fractional Sizes.....	127A.....	260
Twist Drill, Letter Sizes.....	127C.....	261

GAUGES (continued)	NUMBER	PAGE
Twist Drill, M.M. Sizes.....	127D, 127E.....	261-262
Twist Drill, Number Sizes.....	127, 127B.....	259-260
LATHE CENTERS.....	100L.....	13
LATHE THREADING TOOL.....	130.....	309
MANDRELS		
Hardened and Ground.....	123.....	253
Taper, with Expanding Sleeves.....	123A.....	254-257
MANUFACTURERS OF DRILL PRESSES.....		79
METAL SLITTING SAWS.....	132, 132A.....	273-285
MILLS (SEE CUTTERS)		
Adjustable Hollow.....	126E.....	287
Cotter.....	{ 126½L } { 126½M }.....	295
End, with Center Cut.....	{ 126½I } { 126½J }.....	292-293
End, with Spiral Flutes.....	{ 126½G } { 126½H }.....	290-291
End, with Straight Shanks.....	126½A.....	286
End, with Taper Shanks.....	{ 126F } { 126½F }.....	288-289
Hollow.....	126½E.....	287
Shell End.....	126P.....	281
Shell End, with Spiral Flutes.....	126½P.....	281
REAMERS		
Adjustable.....	120E, 120T, 500, 203-241-242	
Adjustable, M.M. Sizes.....	120E-B.....	204
Adjustable, Morse Taper Shanks.....	120½E.....	205
Adjustable, Shell.....	120N.....	238
Adjustable, Shell.....	500.....	242
Bit Stock Taper.....	120B.....	196
Bit Stock Taper in Sets.....	120B.....	174
Boiler.....	120R, 120S.....	239-240
Bridge.....	120C, 120S.....	198-240
Bridge, Morse Taper Shanks.....	120½C, 120R.....	199-239
Center.....	120H.....	233
CHUCKING		
Floating.....	119D.....	191
Fluted.....	119, 119A.....	185-186
Fluted, for Screw or Chucking Machines.....	119B, 119C.....	187-190
Four-Groove.....	120F-H.....	230
Rose.....	120, 120½.....	192-193
Three-Groove.....	120F.....	206-209
Three-Groove, Morse Taper Shanks and { Oil Holes.....	{ 120F-C } { 120F-F }.....	214-217 222-225
Three-Groove, for Screw or Chucking Machines.....	120F-B.....	210-213
Three-Groove, Straight Shanks and { Oil Holes.....	{ 120F-E } { 120F-G }.....	218-221 226-229
Expanding.....	120K.....	234
Expanding with Guide.....	120J.....	236
Expanding, Morse Taper Shanks.....	120½K.....	234

REAMERS (continued)	NUMBER	PAGE
Expanding Shell.....	120M, 120M-A	235-237
Expansion, Floating.....	119E	191
Expansion with Guide.....	120G	231
Expansion, with Guide, M.M. Sizes.....	120½G	232
Expansion Shell, with Straight Holes.....	120M-A	237
Four-Groove Chucking, Morse Taper Shanks.....	120F-H	230
Floating.....	119D	191
Floating Expansion.....	119E	191
Fluted Chucking, Morse Taper Shanks.....	119A	186
Fluted Chucking, for Screw or Chucking Machines.....	119B	187-188
Fluted Chucking, Straight Shanks.....	119	185
Jobbers'.....	115	163
Jobbers' M.M. Sizes.....	115E	168-169
Jobbers' Morse Taper Shanks.....	115A	164
Jobbers, in Sets.....		174
Jobbers' with Spiral Flutes.....	115B	165
Jobbers' with Spiral Flutes, Morse Taper Shanks.....	115D	167
Jobbers' with Threaded Ends.....	115C	166
Jobbers' with Threaded Ends, M.M. Sizes.....	115F	170-171
Locomotive.....	120A	194
Locomotive, Morse Taper Shanks.....	120½A	195
Morse Taper.....	118, 118½	182
Morse Taper, Morse Taper Shanks.....	118B, 118½B	183
Morse Taper in Sets.....		174
Morse Taper, Taper Square Shanks.....	118C	183
Pipe.....	137	312
Rose Chucking, Morse Taper Shanks.....	120½	193
Rose Chucking, for Screw or Chucking Machines.....	119C	189-190
Rose Chucking, Straight Shanks.....	120	192
Rose Shell.....	117A	175-176
Rose Shell, M.M. Sizes.....	117½B	179-180
in SETS.....		174
Shell.....	117	175-176
Shell, Adjustable.....	120N, 500	238-242
Shell, Expanding.....	120M, 120M-A	235-237
Shell, M.M. Sizes.....	117B	179-180
Shell, with Spiral Flutes.....	117½	177-178
Shell, with Straight Holes.....	117C	181
Solid, Short Set.....	116	172
Solid, with Threaded Ends.....	116A	173
Straight, with Taper End.....	120S	240
Straight, with Taper End, Morse Taper Shanks.....	120R	239
Taper, Bit Stock.....	120B	196
Taper, B. & S. Standard.....	118D, 118½D	184
Taper, Special.....	118A, 118½A	182

REAMERS (continued)	NUMBER	PAGE
Taper, Straight Shanks.....	120½B.....	197
Taper Pin.....	120D.....	200
Taper Pin, Half Round.....	120D-E.....	202
Taper Pin, Morse Taper Shanks.....	120D-A.....	201
Taper Pin, in Sets.....	120D.....	174
Three-Groove Chucking, Morse Taper Shanks.....	120F.....	206-209
Three-Groove Chucking, Oil Holes, and Morse Taper Shanks.....	120F-C.....	214-217
Three-Groove Chucking, Oil Holes, Straight Shanks.....	120F-F.....	222-225
Three-Groove Chucking, Oil Holes, Straight Shanks.....	120F-E.....	218-221
Three-Groove Chucking, Straight Shanks.....	120F-G.....	226-229
Three-Groove Chucking, Straight Shanks.....	120F-B.....	210-213
SCREW PLATES		
No. 1 with Taps and Dies.....	154.....	335
No. 1 with Taps and Dies in Morocco Case.....	158.....	336
A, B, C.....	153.....	334
D and E.....	151.....	334
Sets including Taps, Dies and Wrenches.....	157.....	335
SLEEVES		
with Clutch Drive.....	100R.....	11
Morse Taper.....	100B.....	7
for Short Shanks.....	100P.....	11
SOCKETS		
Andrew's.....	100G, 100H.....	9
Floating.....	100S.....	12
Lathe.....	100F.....	7
Morse Taper.....	100, 100A.....	6
for Oil Drills.....	100D, 100E.....	8
for Short Shanks.....	100M, 100N.....	10
Solid.....	100T.....	12
SOCKET KEYS.....	100C.....	7
TAPER PINS.....	136A.....	258
TABLES		
Average Lengths of Stay Bolt Taps.....		331
Depth of Space and Thickness of Teeth of Spur Wheels.....		296-297
Diameters of Sprocket Wheels.....		309
Showing Corresponding Diametral and Circular Pitches.....		306
TAPS:		
for Beaman & Smith Holders.....	143.....	325
Bit Brace.....	141B.....	323
Blacksmiths' Taper.....	150.....	333
Boiler, Straight and Taper.....	146A.....	327
Hob.....	136D.....	313
Hob.....	142, 144, 145.....	324-326
Hob or Master.....	142.....	324
Machine or Nut.....	139.....	319-320
Machine Screw.....	140.....	321
Machine Screw, A. S. M. E. Standard.....	140A.....	322
Machinists' Hand.....	138.....	315-317

---

**MORSE TWIST DRILL AND MACHINE COMPANY.**

---

TAPS (continued)	NUMBER	PAGE
Machinists' Hand, A. L. A. M. Standard . . . . .	138A . . . . .	318
Mud or Washout . . . . .	146B . . . . .	328-329
Patch Bolt . . . . .	146 . . . . .	326
Pipe . . . . .	{ 136, 136B, } { 136C, 136D } . . . . .	312-314
Pipe, and Drills Combined . . . . .	133, 133A . . . . .	311-312
Pipe Hob . . . . .	136D . . . . .	313
Plug Pipe . . . . .	136B . . . . .	313
Pulley . . . . .	141 . . . . .	323
Seller's Hob . . . . .	145 . . . . .	326
Short Plug Hob . . . . .	144 . . . . .	325
Spindle Stay Bolt . . . . .	149A . . . . .	332
Stay Bolt . . . . .	149 . . . . .	331
Stove Bolt . . . . .	148 . . . . .	330
Straight Plug Pipe . . . . .	136B . . . . .	313
Taper Pipe . . . . .	136 . . . . .	312
Tapper . . . . .	147 . . . . .	330
Whitworth Pipe . . . . .	136C . . . . .	314
<b>WRENCHES</b>		
Adjustable . . . . .	155, 156 . . . . .	336
for Adjustable Reamers . . . . .		233
for Beach and Stetson Chucks . . . . .	121A . . . . .	160

# RECAPITULATION OF INDEX BY NUMBERS.

NUMBER		PAGE
1	Drill Cases .....	1
2	Drill Cases .....	2
3	Drill Cases .....	3
4	Drill Cases .....	4-5
100	Sockets, Morse Taper .....	6
100A	Sockets, Morse Taper .....	6
100B	Sleeves, Morse Taper .....	7
100C	Socket Keys .....	7
100D	Sockets for Oil Drills .....	8
100E	Sockets for Oil Drills .....	8
100F	Lathe Sockets .....	7
100G	Andrew's Sockets .....	9
100H	Andrew's Sockets .....	9
100L	Lathe Centers .....	13
100M	Sockets for Short Shanks .....	10
100N	Sockets for Short Shanks .....	10
100P	Sleeves for Short Shanks .....	11
100R	Sleeves with Clutch Drive .....	11
100S	Floating Sockets .....	12
100T	Solid Sockets .....	12
102	Morse Taper Shank Drills .....	14-21
102	Morse Taper Shank Drills, shanks larger than regular .....	22-23
102A	Drills with Oil Holes, Morse Taper Shanks .....	118-121
102B	Drills with Oil Holes, Morse Taper Shanks .....	122-125
102C	Drills with Oil Holes, Morse Taper Shanks .....	126-129
102D	Oil Drills, Special Lengths .....	115
102E	Morse Taper Shank Drills, M.M. Sizes .....	24-29
102F	Three-Groove Drills, Morse Taper Shanks .....	94-98
102G	Four-Groove Drills, Morse Taper Shanks .....	104-107
102H	Shell Drills .....	112-113
102J	Reamer Drills, Morse Taper Shanks .....	30
102½	Drills with Grooved Shanks for Andrew's Socket .....	13
102½H	Shell Drills with Straight Holes .....	114
104	Straight Shank Taper Length Drills .....	31-37
104A	Drills with Oil Holes, Straight Shanks .....	130-131
104B	Drills with Oil Holes, Straight Shanks .....	132-133
104C	Oil Drills, Special Lengths .....	115
104D	Drills with Oil Holes, Straight Shanks .....	134-135
104E	Drills with Oil Holes, Straight Shanks .....	136-137
104F	Straight Shank Taper Length Drills, M.M. Sizes .....	38-42
104G	Three-Groove Drills, Straight Shanks .....	99-103
104H	Four-Groove Drills, Straight Shanks .....	108-111
104K	Drills with Oil Holes, Straight Shanks, M.M. Sizes .....	138-140
104L	Drills with Oil Holes, Straight Shanks, M.M. Sizes .....	141-143
104M	Drills with Grooved Shanks, Taper Lengths .....	43-48
104N	Reamer Drills, Straight Shank Taper Lengths .....	49
105	Straight Shank Drills, Jobbers' Lengths .....	50



NUMBER		PAGE
105A	Straight Shank Drills, Wire and Jobbers' Lengths, M.M. Sizes.....	51-54
105B	Drills with Grooved Shanks, Jobbers' Lengths.....	55
105C	Track Drills.....	93
106	Straight Shank Drills, Letter Sizes.....	56
107	Straight Shank Drills Wire Sizes.....	57-59
107B	Straight Shank Jewelers' Drills, Wire Sizes.....	60-61
107C	Straight Shank Jewelers' Drills, Fractional Sizes.....	61
108	Bit Point Drills, Straight Shanks.....	63
108A	Bit Point Drills, Prentice Shanks.....	64
108B	Bit Point Drills, Morse Taper Shanks.....	65
108C	Special Machine Bits.....	66
108D	Special Machine Bits.....	66
108E	Special Machine Bits.....	66
108F	Special Machine Bits.....	66
108G	Special Machine Bits.....	66
108H	Pod Bits.....	66
108J	Paper Drills.....	66
108K	Bit Point Drills and Counterbores.....	67
108L	Bit Point Drills and Counterbores.....	67
108M	Bit Point Drills and Counterbores.....	67
108N	Routing Bits.....	67
108P	Single Groove Drills.....	68
108R	Single Groove Drills.....	68
108S	Single Groove Drills.....	68
108T	Screw Shank Drills, fitting Prybil Machines.....	68
109	Bit Stock Drills.....	69-70
109A	Three-Groove-Bit Stock Countersinks.....	244
109B	Combined Drills and Countersinks.....	244
109C	Combined Drills and Countersinks.....	245
109D	Counterbores, Morse Taper Shanks.....	246
109E	Taper Square Shank Drills.....	73-74
109F	Counterbores with Interchangeable Blades and Guides.....	247
109J	Counterbores and Countersinks for Machine Screw Heads.....	246
109K	Counterbores, Morse Taper Shanks.....	248
109L	Counterbores, Straight Shanks.....	249
109½	Bit Stock Drills, M.M. Sizes.....	71-72
109½B	Combined Drills and Countersinks with ½ and ⅝ inch Bodies.....	245
109½E	Taper Square Shank Drills, M.M. Sizes.....	75-78
110	Drills fitting Coe's Press.....	80-81
111	Drills fitting Prentice Press, Taper Lengths.....	82-83
112	Drills fitting Silver & Deming's Press, Short Lengths..	84-85
114A	Straightway Drills, Straight Shanks, Jobbers' Lengths.	86
114B	Straightway Drills, Morse Taper Shanks.....	87-89
114C	Straightway Drills, Wire Sizes.....	91
114D	Hollow Drills.....	144
114E	Center Drills, Fractional Sizes.....	92
114F	Center Drills, Wire Sizes.....	92
114G	Center Drills, M.M. Sizes.....	93

NUMBER		PAGE
114½B	Straightway Drills, Straight Shanks, Taper Length....	90-91
115	Jobbers' Reamers.....	163
115A	Jobbers' Reamers, Morse Taper Shanks.....	164
115B	Jobbers' Reamers, Spiral Flutes.....	165
115C	Jobbers' Reamers, Threaded Ends.....	166
115D	Jobbers' Reamers, Spiral Flutes.....	167
115E	Jobbers' Reamers, M.M. Sizes.....	168-169
115F	Jobbers' Reamers, Threaded Ends, M.M. Sizes.....	170-171
116	Solid Reamers.....	172
116A	Solid Reamers, Threaded Ends.....	173
117	Shell Reamers.....	175-176
117A	Rose Shell Reamers.....	175-176
117B	Shell Reamers, M.M. Sizes.....	179-180
117C	Shell Reamers, with Straight Holes.....	181
117½	Shell Reamers, Spiral Flutes.....	177-178
117½B	Shell Reamers, M.M. Sizes.....	179-180
118	Morse Taper Finishing Reamers.....	182
118A	Taper Reamers, Special Lengths.....	182
118B	Morse Taper Finishing Reamers, Morse Taper Shanks.....	183
118C	Morse Taper Reamers, Taper Square Shanks.....	183
118D	Taper Finishing Reamers, B. & S. Standard.....	184
118½	Morse Taper Roughing Reamers.....	182
118½A	Taper Reamers, Special Lengths.....	182
118½B	Morse Taper Roughing Reamers, Morse Taper Shanks.....	183
118½D	Taper Roughing Reamers, B. & S. Standard.....	184
119	Fluted Chucking Reamers, Straight Shanks.....	185
119A	Fluted Chucking Reamers, Morse Taper Shanks.....	186
119B	Fluted Chucking Reamers for Turret Machines.....	187-188
119C	Rose Chucking Reamers, for Turret Machines.....	189-190
119D	Floating Reamers.....	191
119E	Floating Expansion Reamers.....	191
120	Rose Chucking Reamers, Straight Shanks.....	192
120A	Locomotive Reamers.....	194
120B	Bit Stock Taper Reamers.....	196
120C	Taper Bridge Reamers.....	198
120D	Taper-Pin Reamers.....	200
120D-A	Taper-Pin Reamers, Morse Taper Shanks.....	201
120D-E	Half-Round Taper-Pin Reamers.....	202
120E	Adjustable Reamers.....	203
120E-B	Adjustable Reamers, M.M. Sizes.....	204
120F	Three-Groove Chucking Reamers, Morse Taper Shanks.....	206-209
120F-B	Three-Groove Chucking Reamers, Straight Shanks.....	210-213
120F-C	Three-Groove Chucking Reamers with Oil Holes.....	214-217
120F-E	Three-Groove Chucking Reamers with Oil Holes.....	218-221
120F-F	Three-Groove Chucking Reamers with Oil Holes.....	222-225
120F-G	Three-Groove Chucking Reamers with Oil Holes.....	226-229
120F-H	Four-Groove Chucking Reamers, Morse Taper Shanks.....	230
120G	Expansion Reamers.....	231
120H	Center Reamers.....	233

---

MORSE TWIST DRILL AND MACHINE COMPANY.

---

NUMBER		PAGE
120J	Expanding Reamers with Guides . . . . .	236
120K	Expanding Reamers . . . . .	234
120M	Expanding Shell Reamers . . . . .	235-236
120M-A	Expansion Shell Reamers with Straight Holes . . . . .	237
120N	Adjustable Shell Reamers . . . . .	238
120R	Bridge or Boiler Reamers, Morse Taper Shanks . . . . .	239
120S	Bridge or Boiler Reamers, Straight Shanks . . . . .	240
120T	Adjustable Reamers . . . . .	241
120 $\frac{1}{2}$	Rose Chucking Reamers, Morse Taper Shanks . . . . .	193
120 $\frac{1}{2}$ A	Locomotive Taper Reamers, Morse Taper Shanks . . . . .	195
120 $\frac{1}{2}$ B	Taper Reamers, Straight Shanks . . . . .	197
120 $\frac{1}{2}$ C	Taper Bridge Reamers, Morse Taper Shanks . . . . .	199
120 $\frac{1}{2}$ E	Adjustable Reamers, Morse Taper Shanks . . . . .	205
120 $\frac{1}{2}$ G	Expansion Reamers with Guide, M.M. Sizes . . . . .	232
120 $\frac{1}{2}$ K	Expanding Reamers, Morse Taper Shanks . . . . .	234
121	Beach Chucks . . . . .	160
121A	Wrenches for Beach and Stetson Chucks . . . . .	160
121 $\frac{1}{2}$	Chuck Jaws . . . . .	160
122	Stetson Chucks . . . . .	161
122C	Stetson Geared Chucks . . . . .	162
123	Hardened and Ground Mandrels . . . . .	253
123A	Taper Mandrels with Expanding Sleeves . . . . .	254-257
124	Center Drill Chucks . . . . .	162
125	Arbors for Beach and Stetson Drill Chucks . . . . .	152
125A	Arbors for Shell Reamers and Shell Drills . . . . .	153
125B	Arbors for Shell End Mills, Morse Taper Shanks . . . . .	154
125C	Arbors with Blank Ends . . . . .	155
125D	Arbors for Face Milling Cutters with Inserted Teeth . . . . .	155
125E	Arbors for Expanding and Adjustable Shell Reamers . . . . .	156
125F	Arbors for Expanding and Adjustable Shell Reamers . . . . .	156
125G	Arbors for Center Drill Chucks . . . . .	155
125H	Arbors for Shell Reamers and Shell Drills . . . . .	156
125J	Arbors for Screw Slotting Cutters . . . . .	157
125K	Floating Arbors for Shell Reamers and Shell Drills with Straight Holes . . . . .	157
125L	Floating Arbors for Shell Reamers and Shell Drills with Taper Holes . . . . .	158
125M	Solid Arbors for Shell Reamers and Shell Drills with Straight Holes . . . . .	159
125N	Solid Arbors for Shell Reamers and Shell Drills with Straight Holes, Morse Taper Shanks . . . . .	159
125P	Arbors for One Lock Adjustable Reamers . . . . .	243
125 $\frac{1}{2}$	Arbors for Beach & Stetson Drill Chucks, Morse Taper Shanks . . . . .	152
125 $\frac{1}{2}$ A	Arbors for Shell Reamers and Shell Drills, Morse Taper Shanks . . . . .	153
125 $\frac{1}{2}$ B	Arbors for Shell End Mills, B. & S. Taper Shanks . . . . .	154
126	Milling Cutters . . . . .	271-272
126A	Angular Cutters . . . . .	273
126B	Side Milling Cutters . . . . .	274
126C	Convex and Concave Milling Cutters . . . . .	277
126D	Cutters for Spiral Mills . . . . .	277

NUMBER		PAGE
126E	Adjustable Hollow Mills.....	287
126F	End Mills, Morse Taper Shanks.....	288
126G	Interlocking Side Milling Cutters.....	275
126H	Cutters for Grooving Taps.....	307
126H-A	Cutters for Grooving Reamers.....	307
126H-B	Cutters for Grooving Taps and Reamers.....	308
126H-C	Cutters for Grooving Taps and Reamers.....	308
126I	Formed Milling Cutters.....	268
126J	Side Milling Cutters with Inserted Teeth.....	278
126K	Formed Cutters for Spiral Mills.....	278
126L	Milling Cutters with Radial Grooves.....	276
126M	Sprocket Wheel Cutters for Block Center Chains.....	279
126M-A	Sprocket Wheel Cutters for Roller Chains.....	279
126N	Corner Rounding Cutters.....	280
126P	Shell End Mills.....	281
126R	Angular Cutters.....	282
126S	Cutters with Double Angle.....	282
126T	Formed Cutters with Double Angle.....	282
126V	T Slot Cutters, Morse Taper Shanks.....	294
126W	T Slot Cutters, B. & S. Taper Shanks.....	294
126X	Gang Cutters.....	269
126Y	Face Milling Cutters with Inserted Teeth.....	286
126Z	Face Milling Cutters with Inserted Teeth.....	270
126 $\frac{1}{2}$ A	Straight Shank End Mills.....	286
126 $\frac{1}{2}$ E	Hollow Mills.....	287
126 $\frac{1}{2}$ F	End Mills, B. & S. Taper Shanks.....	289
126 $\frac{1}{2}$ G	End Mills, with Spiral Flutes, Morse Taper Shanks....	290
126 $\frac{1}{2}$ H	End Mills, with Spiral Flutes, B. & S. Taper Shanks..	291
126 $\frac{1}{2}$ I	End Mills, with Center Cut, Morse Taper Shanks....	292
126 $\frac{1}{2}$ J	End Mills, with Center Cut, B. & S. Taper Shanks....	293
126 $\frac{1}{2}$ K	Gang of Spiral Mills and Side Milling Cutters.....	270
126 $\frac{1}{2}$ L	Cotter Mills, Morse Taper Shanks.....	295
126 $\frac{1}{2}$ M	Cotter Mills, B. & S. Taper Shanks.....	295
126 $\frac{1}{2}$ P	Shell End Mills with Spiral Flutes.....	281
127	Drill Gauges, Number Sizes.....	259
127A	Drill Gauges, Fractional Sizes.....	260
127B	Drill Gauges, Number Sizes.....	260
127C	Drill Gauges, Letter Sizes.....	261
127D	Drill Gauges, M.M. Sizes.....	261
127E	Drill Gauges, M.M. Sizes.....	262
128	Plug and Ring Gauges.....	263-264
128A	Adjustable Caliper Gauges.....	265
128B	Standard Reference Disks.....	266
128C	Morse Taper Plug and Ring Gauges.....	267
130	Lathe Threading Tool.....	309
131	Screw Slotting Cutters.....	283-284
131A	Stocking Cutters for Involute Gears.....	297
131B	Gear Cutters.....	300
131C	Cutters for Mitre and Bevel Gears.....	305
131D	Stocking Cutters for Involute Gears.....	298
131E	Stocking Cutters for Involute Gears.....	298

---

MORSE TWIST DRILL AND MACHINE COMPANY.

---

NUMBER		PAGE
131F	Stocking Cutters for Involute Gears.....	299
131G	Stocking Cutters for Involute Gears.....	299
131H	Gear Cutters, Large Diameters.....	301
131J	Gear Cutters.....	302
131K	Gear Cutters.....	302
131L	Gear Cutters.....	303
131M	Gear Cutters.....	303
131N	Gear Cutters, Circular Pitch.....	304
132	Metal Slitting Saws.....	285
132A	Metal Slitting Saws.....	273
133	Combined Pipe Taps and Drills.....	312
133A	Combined Pipe Taps and Drills for Tapping Machines	311
136	Taper Pipe Taps.....	312
136A	Taper Pins.....	258
136B	Straight Plug Pipe Taps.....	313
136C	Whitworth Pipe Taps.....	314
136D	Pipe Hob Taps.....	313
137	Pipe Reamers.....	312
138	Machinists' Hand Taps.....	315-317
138½	Machinists' Hand Taps, A. L. A. M. Standard.....	318
139	Machine or Nut Taps.....	319-320
140	Machine Screw Taps.....	321
140A	Machine Screw Taps, A. S. M. E. Standard.....	322
141	Pulley Taps.....	323
141B	Bit Brace Taps.....	323
142	Hob or Master Taps.....	324
143	Taps for Beaman & Smith Holders.....	325
144	Short Plug Hob Taps.....	325
145	Sellers' Hob Taps.....	326
146	Patch-Bolt Taps.....	326
146A	Straight and Taper Boiler Taps.....	327
146B	Mud or Washout Taps.....	328-329
147	Tapper Taps.....	330
148	Stove-Bolt Taps.....	330
149	Stay Bolt Taps.....	331
149½	Spindle Stay-Bolt Taps.....	332
150	Blacksmiths' Taper Taps.....	333
151	Screw Plates, D and E.....	334
152	Screw Plate Dies.....	334
153	Screw Plates, A, B and C.....	334
154	Screw Plate No. 1 with Taps and Dies.....	335
155	Adjustable Tap Wrenches No. 0.....	336
156	Adjustable Tap Wrenches A, B, C, D, E, F.....	336
157	Screw Plates with Taps, Dies and Wrenches.....	335
158	Screw Plates with Taps, Dies and Wrenches in Morocco Case.....	336
159	Solid Pipe Dies.....	337
160	Solid Dies for Boynton & Plummer's Bolt Cutters.....	338
161	Machine or Solid Bolt-Dies.....	338
500	Adjustable Shell Reamer.....	242-243
	Cups for Use in Oil Drills.....	115

	PAGE
Drill Press Manufacturers .....	79
Drills in Sets .....	145-151
Formed Cutters .....	270
General information in ordering Gear Cutters .....	296-297
Left Hand Drills .....	62
Reamers in Sets .....	174
Screw Sets in Blocks .....	250-252
Sectional Cases .....	1
Tables:	
Average Lengths of Stay Bolt Taps .....	331
Depth of Space and Thickness of Tooth in Spur Wheels .....	296-297
Diameters of Sprocket Wheels .....	309
Showing corresponding Diametral and Circular Pitches .....	306
Tang Gauge for Short Shank Sockets .....	11
Use of Drills with Oil Holes .....	116-117
Use of Hollow Drills .....	116
Why the use of U. S. Standard Thread is preferable .....	310
Wrenches for Adjustable Reamers .....	233

# MORSE TWIST DRILL AND MACHINE CO.

## DISCOUNT SHEET

### APPLYING TO SOCKET SECTION

Pages 1 to 13 Inclusive

<b>DRILL CASES</b>	
Nos. 1, 2, 3, 4. ....	.....
Boxes (sectional cases) .....	.....
<b>LATHE CENTRES</b>	
No. 100 L .....	.....
<b>SOCKETS AND SLEEVES</b>	
No. 100 (1, 2, 3, 4, 5).....	.....
No. 100 (6) .....	.....
No. 100 A (1, 2, 3, 4) .....	.....
No. 100 A (Nos. 4 to 6, 5 to 4, 5 to 5, 5 to 6) ..	.....
No. 100 B (1, 2, 3, 4) .....	.....
No. 100 B (Nos. 4 to 6, 5 to 6).....	.....
Nos. 100 D, 100 E, 100 F, 100 G, 100 H .....	.....
No. 100 M (1, 2, 3, 4, 5) .....	.....
No. 100 M (6) .....	.....
No. 100 N (1, 2, 3, 4).....	.....
No. 100 N (Nos. 4 to 6, 5 to 6).....	.....
No. 100 P (1, 2, 3, 4) .....	.....
No. 100 P (Nos. 4 to 6, 5 to 6) .....	.....
No. 100 R.....	On application.
Drills fitted for Clutch Drive .....	On application.
No. 100 S,.....	.....
No. 100 T .....	.....
<b>SOCKET KEYS</b>	
No. 100 C .....	.....
<b>TANG GAUGES</b> .....	On application.

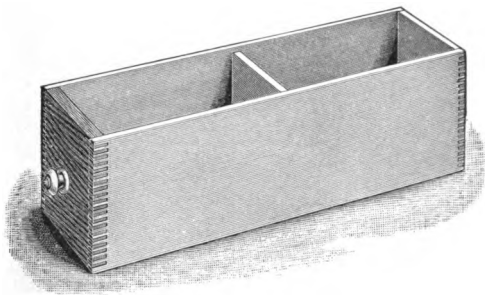




## SECTIONAL CASES.

CONSISTING OF BOXES WITH OAK FRONTS.

Many customers do not find the cases illustrated practical, therefore we keep in stock boxes as described below. They can be placed upon the shelves and present a very satisfactory appearance.

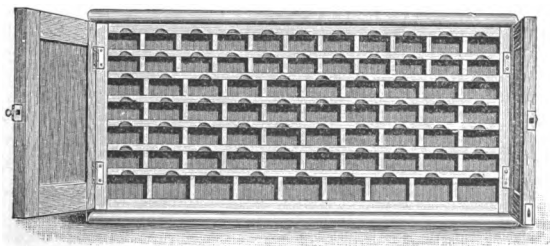


### OUTSIDE DIMENSIONS:

15 $\frac{1}{8}$ inches long,	5 $\frac{5}{8}$ inches wide,	5 $\frac{1}{8}$ inches deep,	} Furnished with 1 to 4 partitions. Specify number required.
15 $\frac{1}{8}$ inches long,	5 $\frac{5}{8}$ inches wide,	5 $\frac{1}{8}$ inches deep,	
15 $\frac{1}{8}$ inches long,	5 $\frac{5}{8}$ inches wide,	4 $\frac{1}{8}$ inches deep,	
15 $\frac{1}{8}$ inches long,	5 $\frac{5}{8}$ inches wide,	3 $\frac{1}{8}$ inches deep,	
15 $\frac{1}{8}$ inches long,	5 $\frac{5}{8}$ inches wide,	3 $\frac{1}{8}$ inches deep,	

Price Each, \$0.25

## CASE FOR DRILLS.



### No. 1—CASE, OUTSIDE DIMENSIONS:

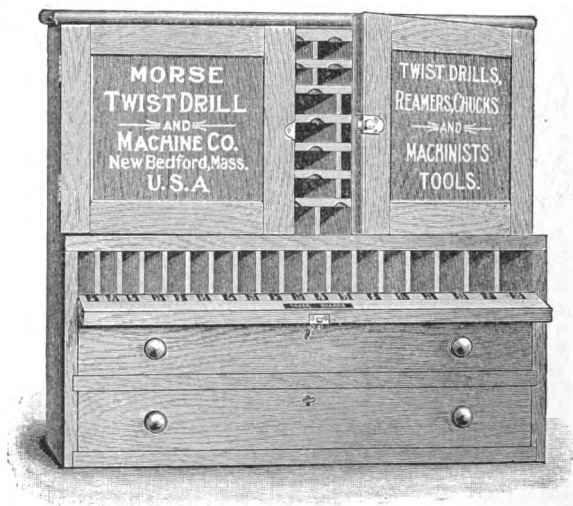
14  $\frac{1}{2}$  inches high.  
28  $\frac{1}{8}$  inches wide.  
8  $\frac{9}{16}$  inches deep.

This Case will hold Steel Wire Gauge and Jobbers' Drills only, and is usually furnished in oak. It can be supplied in other woods at special prices.

Weight of Case boxed for shipment, 55 lbs.

Price of Case boxed for shipment, \$10.00

## CASE FOR DRILLS.



## No. 2—CASE, OUTSIDE DIMENSIONS:

25  $\frac{1}{2}$  inches high.28  $\frac{1}{8}$  inches wide.

12 inches deep at the base.

This Case is usually furnished in oak. It can be supplied in other woods at special prices.

This Case will hold Drills, viz:—

Drills, Steel Wire Gauge, from No. 1 to No. 80. (See pages 57, 59.)

Jobbers' Straight Shank Drills,  $\frac{1}{8}$  to  $\frac{1}{2}$  inch, by 64ths. (See page 50.)

Taper Shank Drills,  $\frac{1}{4}$  to  $\frac{3}{4}$  inch, varying by 32nds. (See pages 14, 15.)

Taper Shank Drills,  $\frac{1}{2}$  to  $1\frac{1}{4}$  inch, varying by 16ths. (See pages 15, 16.)

Jewelers' Drills, Chucks, and Sockets.

Weight of Case boxed for shipment, 95 lbs.

Price of Case boxed for shipment, \$14.50

## CASE FOR DRILLS.

**No. 3—CASE, OUTSIDE DIMENSIONS:**

33½ inches high, 34¾ inches wide, 15½ inches deep without base.

This Case will hold Drills, viz:—

Drills, Steel Wire Gauge, from No. 1 to No. 65. (See pages 57, 59.)

Jobbers' Straight Shank Drills,  $\frac{1}{16}$  to  $\frac{1}{2}$  inch, by 64ths. (See page 50.)

Taper Shank Drills,  $\frac{1}{4}$  to  $1\frac{1}{4}$  inch, varying by 32nds. (See pages 14, 16.)

Bit Stock Drills,  $\frac{1}{8}$  to  $\frac{1}{2}$  inch, varying by 32nds. (See page 69.)

Bit Stock Drills,  $\frac{3}{8}$  to  $\frac{1}{2}$  inch, varying by 16ths. (See page 69, 70.)

This Case has two drawers at the bottom which will hold sockets and assorted tools.

Weight of Case boxed for shipment, 175 lbs.

Price of Case boxed for shipment, \$25.00

**OAK BASE FOR CASE No. 3.**

Base for Case No. 3 can be furnished as desired of the following dimensions, with partitions similar to the lower part of No. 3 Case.

**DIMENSIONS:**

34 inches high,  $40\frac{3}{4}$  inches wide,  $18\frac{3}{4}$  inches deep.

Base fitted with metal partitions which are adjustable and can be spaced about 1 inch apart.

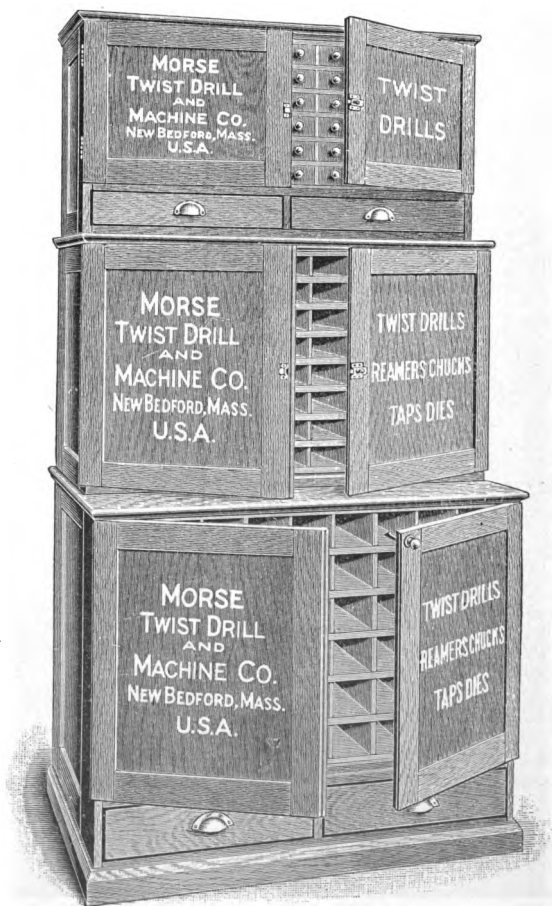
Weight of Base boxed for shipment, 200 lbs.

Price of Base boxed for shipment, \$20.00

This Case and Base are usually furnished in oak. They can be supplied in other woods at special prices.

## SECTIONAL DRILL CASES.

## No. 4 CASE.



For assortment of tools and general description see page 5.  
Weight boxed for shipment with drawers, 650 lbs.  
Weight boxed for shipment with partitions, 575 lbs.  
Prices on application.

**SECTIONAL DRILL CASES.****No. 4—CASE.****SECTION A—DIMENSIONS:**

21 inches high.  
40½ inches wide.  
14⅝ inches deep.

This Case holds the following Drills:

Wire Drills No. 1 to No. 80. (See pages 57, 59.)

Jobbers' Drills  $\frac{1}{8}$  to  $\frac{1}{2}$  by 64ths. (See pages 50, 51.)

Bit Stock Drills  $\frac{1}{8}$  to  $\frac{1}{2}$  by 32nds and  $\frac{3}{8}$  to 1 inch by 16ths. (See pages 69, 70.)

Two large drawers at bottom.

**SECTION B—DIMENSIONS:**

23⅜ inches high.  
40½ inches wide.  
18⅜ inches deep.

Holds Taper Shank Drills from  $\frac{3}{8}$  to 1½ inches by 64ths. (See pages 15, 16, 17.)

Fitted with Metal Partitions.

**SECTION C—DIMENSIONS:**

33¼ inches high.  
41 inches wide.  
26 inches deep.

Holds Taper Shank Drills from 1½ to 3 inches by 16ths. (See pages 17, 20.)

Fitted with metal partitions or drawers of the following dimensions:  $3\frac{3}{8}$  x  $11\frac{3}{4}$  x 18 inches.

Two large drawers at bottom.

Can use partitions or remove them and use instead 18 drawers.

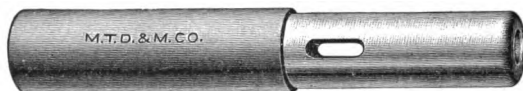
Total height of sections A, B and C,  $77\frac{5}{8}$  inches.

This Case can be used to hold other tools than those mentioned above.

Further information will be furnished on application.

## No. 100. STEEL SOCKETS.

FOR MORSE TAPER SHANK DRILLS.



Size.	Price Each.
No. 1. Holds $\frac{1}{4}$ to $\frac{1}{2}$ inch, inclusive, Whole length 7 inches; blank end, $1\frac{1}{16}$ inches diameter, 4 inches long.	\$1.20
No. 2. Holds $\frac{3}{8}$ to $\frac{1}{2}$ inch, inclusive, Whole length, 8 inches; blank end, $1\frac{1}{4}$ inches diameter, $4\frac{1}{4}$ inches long.	\$1.80
No. 3. Holds $\frac{1}{2}$ to $1\frac{1}{4}$ inches, inclusive, Whole length, 10 inches; blank end, $1\frac{1}{2}$ inches diameter, $5\frac{3}{8}$ inches long.	\$2.50
No. 4. Holds $1\frac{1}{4}$ to 2 inches, inclusive, Whole length, 12 inches; blank end, 2 inches diameter, $6\frac{3}{8}$ inches long.	\$4.00
No. 5. Holds $2\frac{1}{4}$ to 3 inches, inclusive, Whole length, 16 inches; blank end, $2\frac{5}{8}$ inches diameter, 9 inches long.	\$7.50
No. 6. Holds $3\frac{1}{4}$ to 6 inches, inclusive, Whole length, 22 inches; blank end, $3\frac{5}{8}$ inches diameter, $12\frac{3}{4}$ inches long.	\$14.00

Plugs are furnished with these sockets for turning shanks.  
These Sockets can be furnished hardened and ground inside and out at special prices.

## No. 100A. STEEL SOCKETS

FOR MORSE TAPER SHANK DRILLS.



Size.	Price Each.
No. 1. With Shank fitted to No. 2 Socket, . . . . .	\$2.00
No. 1. With Shank fitted to No. 3 Socket, . . . . .	2.50
No. 1. With Shank fitted to No. 4 Socket, . . . . .	3.20
No. 1. With Shank fitted to No. 5 Socket, . . . . .	4.80
No. 2. With Shank fitted to No. 3 Socket, . . . . .	2.50
No. 2. With Shank fitted to No. 4 Socket, . . . . .	3.20
No. 2. With Shank fitted to No. 5 Socket, . . . . .	4.80
No. 3. With Shank fitted to No. 2 Socket, . . . . .	3.20
No. 3. With Shank fitted to No. 3 Socket, . . . . .	3.20
No. 3. With Shank fitted to No. 4 Socket, . . . . .	3.20
No. 3. With Shank fitted to No. 5 Socket, . . . . .	4.80
No. 4. With Shank fitted to No. 3 Socket, . . . . .	4.80
No. 4. With Shank fitted to No. 4 Socket, . . . . .	4.80
No. 4. With Shank fitted to No. 5 Socket, . . . . .	4.80
No. 4. With Shank fitted to No. 6 Socket, . . . . .	12.00
No. 5. With Shank fitted to No. 4 Socket, . . . . .	12.00
No. 5. With Shank fitted to No. 5 Socket, . . . . .	12.00
No. 5. With Shank fitted to No. 6 Socket, . . . . .	12.00

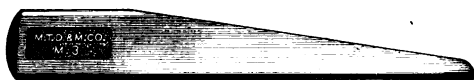
These Sockets can be furnished hardened and ground, inside and out, at special prices.



**No. 100B.**  
**STEEL SLEEVES**  
 FOR MORSE TAPER SHANK  
 DRILLS.

Size	Price Each.
No. 1. Fitted to No. 2 Socket, . . . . .	\$1.80
No. 1. Fitted to No. 3 Socket, . . . . .	2.40
No. 1. Fitted to No. 4 Socket, . . . . .	3.00
No. 1. Fitted to No. 5 Socket, . . . . .	4.40
No. 2. Fitted to No. 3 Socket, . . . . .	2.40
No. 2. Fitted to No. 4 Socket, . . . . .	3.00
No. 2. Fitted to No. 5 Socket, . . . . .	4.40
No. 3. Fitted to No. 4 Socket, . . . . .	3.00
No. 3. Fitted to No. 5 Socket, . . . . .	4.40
No. 4. Fitted to No. 5 Socket, . . . . .	4.40
No. 4. Fitted to No. 6 Socket, . . . . .	10.00
No. 5. Fitted to No. 6 Socket, . . . . .	10.00

These Sleeves can be furnished hardened and ground, inside and out, at special prices.



**No. 100C.**  
**CENTER KEYS**  
 FOR SOCKETS AND  
 SLEEVES.

Size	Price Each.
No. 1 Key for No. 1 Socket or Sleeve, . . . . .	\$ .30
No. 2 Key for No. 2 Socket or Sleeve, . . . . .	.35
No. 3 Key for No. 3 Socket or Sleeve, . . . . .	.40
No. 4 Key for No. 4 Socket or Sleeve, . . . . .	.50
No. 5 Key for No. 5 Socket or Sleeve, . . . . .	.60
No. 6 Key for No. 6 Socket or Sleeve, . . . . .	.75

These Keys are drop-forged, from Steel, and are finished and hardened.  
 For No. 100 D see page 8      For No. 100 E see page 8



**No. 100F.**  
**LATHE SOCKETS.**

Size	Price Each.
No. 1 Holds $\frac{1}{4}$ to $\frac{1}{8}$ inch, inclusive, . . . . .	\$1.20
No. 2 Holds $\frac{3}{16}$ to $\frac{3}{8}$ inch, inclusive, . . . . .	1.80
No. 3 Holds $\frac{7}{16}$ to $1\frac{1}{4}$ inches, inclusive, . . . . .	2.50
No. 4 Holds $1\frac{1}{4}$ to 2 inches, inclusive, . . . . .	4.00
No. 5 Holds $2\frac{1}{4}$ to 3 inches, inclusive, . . . . .	7.50

The end fitting the Lathe Center is deeply countersunk to insure a good bearing. These Sockets are hardened.

**No. 100 D.**  
**MORSE TAPER SOCKETS**  
 FOR OIL DRILLS.



Size.	Price Each.
No. 1. Holds $\frac{1}{4}$ to $\frac{3}{8}$ inch, inclusive, Whole length, 7 inches; blank end, $1\frac{1}{8}$ inches diameter, 4 inches long.	\$4.00
No. 2. Holds $\frac{3}{8}$ to $\frac{1}{2}$ inch, inclusive, Whole length, 8 inches; blank end, $1\frac{1}{4}$ inches diameter, $4\frac{1}{4}$ inches long.	\$5.00
No. 3. Holds $\frac{1}{2}$ to $1\frac{1}{4}$ inches, inclusive, Whole length, 10 inches; blank end, $1\frac{1}{2}$ inches diameter, $5\frac{3}{8}$ inches long.	\$6.50
No. 4. Holds $1\frac{1}{4}$ to 2 inches, inclusive, Whole length, 12 inches; blank end, 2 inches diameter, $6\frac{3}{8}$ inches long.	\$9.25
No. 5. Holds $2\frac{1}{4}$ to 3 inches, inclusive, Whole length, 16 inches; blank end, $2\frac{5}{8}$ inches diameter, 9 inches long.	10.25

**No. 100 E.**  
**MORSE TAPER SOCKETS**  
 FOR OIL DRILLS.



Size.	Price Each.
No. 1. With Shank fitted to No. 2 Socket, . . . . .	\$4.50
No. 1. With Shank fitted to No. 3 Socket, . . . . .	4.50
No. 2. With Shank fitted to No. 3 Socket, . . . . .	5.50
No. 2. With Shank fitted to No. 4 Socket, . . . . .	6.75
No. 3. With Shank fitted to No. 4 Socket, . . . . .	7.00
No. 4. With Shank fitted to No. 5 Socket, . . . . .	10.00

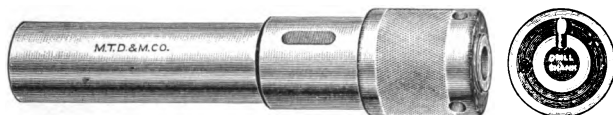
Sockets Nos. 100 D and 100 E are used in connection with oil drills which are illustrated on pages 126, 129, and the method of using is illustrated on page 117. As the use of oil sockets and oil drills is now quite generally understood we do not furnish further explanation in this catalogue, but will gladly do so when requested.

For 100 F see page 7.



**No. 100 G.****ANDREW'S PATENT DRILL SOCKETS**

FOR MORSE TAPER SHANK DRILLS.

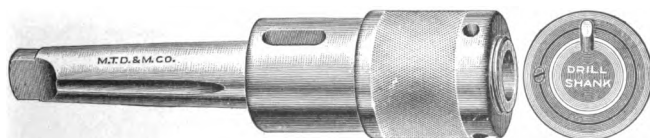


These Sockets are fitted with a Key sliding in a radial slot in the holding head. The Key bears upon the inclined seat in the shank of the drill and is forced to its seat by a cap fitting over the holding head. Turning the cap by the hand in one direction holds the drill firmly in place while turning it in the opposite direction releases its grip so that the drill can be easily removed.

Size.	Price Each.
No. 1. Holds $\frac{1}{4}$ to $\frac{3}{8}$ inch, inclusive, . . . . .	\$5.00
Whole length, 7 inches; blank end, $1\frac{1}{8}$ inches diameter, 4 inches long.	
No. 2. Holds $\frac{3}{8}$ to $\frac{1}{2}$ inch, inclusive, . . . . .	\$6.50
Whole length, 8 inches; blank end, $1\frac{1}{4}$ inches diameter, $4\frac{1}{4}$ inches long.	
No. 3. Holds $\frac{1}{2}$ to $1\frac{1}{4}$ inches, inclusive, . . . . .	\$9.00
Whole length, 10 inches; blank end, $1\frac{1}{2}$ inches diameter, $5\frac{3}{8}$ inches long.	
No. 4. Holds $1\frac{1}{4}$ to 2 inches, inclusive, . . . . .	\$12.00
Whole length, 12 inches; blank end, 2 inches diameter, $6\frac{3}{8}$ inches long.	
No. 5. Holds $2\frac{1}{4}$ to 3 inches, inclusive, . . . . .	\$15.00
Whole length, 16 inches; blank end, $2\frac{5}{8}$ inches diameter, 9 inches long.	
Same style as No. 100, except hole is fitted for grip as shown in cut.	

**No. 100 H.****ANDREW'S PATENT DRILL SOCKETS**

FOR MORSE TAPER SHANK DRILLS.



Size.	Price Each.
No. 1. With Shank fitted to No. 2 Socket, . . . . .	\$5.80
No. 1. With Shank fitted to No. 3 Socket, . . . . .	5.80
No. 2. With Shank fitted to No. 3 Socket, . . . . .	7.20
No. 2. With Shank fitted to No. 4 Socket, . . . . .	8.60
No. 3. With Shank fitted to No. 4 Socket, . . . . .	9.70
No. 4. With Shank fitted to No. 5 Socket, . . . . .	12.80
No. 5. With Shank fitted to No. 6 Socket, . . . . .	19.50

For illustration of drills fitting these sockets see page 13.

**No. 100 M.****STEEL SOCKETS FOR SHORT SHANKS**

MORSE TAPER.



Size	Price Each
No. 1. Holds $\frac{1}{4}$ to $\frac{3}{16}$ inch, inclusive, Whole length, 7 inches; blank end, $1\frac{1}{8}$ inches diameter, 4 inches long.	\$1.20
No. 2. Holds $\frac{3}{16}$ to $\frac{1}{4}$ inch, inclusive, Whole length, 8 inches; blank end, $1\frac{1}{4}$ inches diameter, $4\frac{1}{4}$ inches long.	\$1.80
No. 3. Holds $\frac{1}{4}$ to $1\frac{1}{4}$ inches, inclusive, Whole length, 10 inches; blank end, $1\frac{1}{2}$ inches diameter, $5\frac{3}{8}$ inches long.	\$2.50
No. 4. Holds $1\frac{1}{4}$ to 2 inches, inclusive, Whole length, 12 inches; blank end, 2 inches diameter, $6\frac{3}{8}$ inches long.	\$4.00
No. 5. Holds $2\frac{1}{4}$ to 3 inches, inclusive, Whole length, 16 inches; blank end, $2\frac{5}{8}$ inches diameter, 9 inches long.	\$7.50
No. 6. Holds $3\frac{1}{4}$ to 6 inches, inclusive, Whole length 22 inches; blank end $3\frac{5}{8}$ inches diameter, $12\frac{3}{4}$ inches long.	\$14.00

Plugs are furnished with these Sockets for truing shanks.  
See note at bottom of page

**No. 100 N.****STEEL SOCKETS FOR SHORT SHANKS.**

MORSE TAPER.



Size	Price Each
No. 1. With Shank fitted to No. 2, . . . . .	\$2.00
No. 1. With Shank fitted to No. 3, . . . . .	2.50
No. 2. With Shank fitted to No. 3, . . . . .	2.50
No. 2. With Shank fitted to No. 4, . . . . .	3.20
No. 3. With Shank fitted to No. 4, . . . . .	3.20
No. 3. With Shank fitted to No. 5, . . . . .	4.80
No. 4. With Shank fitted to No. 5, . . . . .	4.80
No. 4. With Shank fitted to No. 6, . . . . .	12.00
No. 5. With Shank fitted to No. 6, . . . . .	12.00

Short Shank Sockets are for use with drills on which the original tangs have been broken, the shanks reduced in length and fitted with thicker and wider tangs thus insuring a strong drive. Gauges for fitting drills with broken tangs to Short Shank Sockets can be furnished on receipt of order, see page 11.



**No. 100 P.**  
**STEEL SLEEVES FOR**  
**SHORT SHANKS**  
**MORSE TAPER.**

Size.		Price Each.
No. 1.	Fitted to No. 2 Socket, . . . . .	\$1.80
No. 1.	Fitted to No. 3 Socket, . . . . .	2.40
No. 2.	Fitted to No. 3 Socket, . . . . .	2.40
No. 2.	Fitted to No. 4 Socket, . . . . .	3.00
No. 3.	Fitted to No. 4 Socket, . . . . .	3.00
No. 3.	Fitted to No. 5 Socket, . . . . .	4.40
No. 4.	Fitted to No. 5 Socket, . . . . .	4.40
No. 4.	Fitted to No. 6 Socket, . . . . .	10.00
No. 5.	Fitted to No. 6 Socket, . . . . .	10.00

See note on page 10.

See Gauge illustrated below.

**No. 100 R.**  
**STEEL SLEEVES WITH CLUTCH DRIVE**  
**FOR MORSE TAPER SHANK DRILLS.**



Designed for use with High Speed Drills or where a strong positive drive is necessary. The drill has no tang being driven entirely by the clutch. Prices on application.

**TANG GAUGE FOR SHORT SHANK SOCKETS**



Prices on application.



### No. 100 S. FLOATING SOCKETS

WITH MORSE  
TAPER HOLES.

Number	Morse Taper Hole, Number.	Diameter of Collet, Inches.	Length of Collet, Inches.	Whole Length, Inches.	Price Each.
1	1	1 1/4	3	4 1/2	\$3.50
2	1	1 1/2	3 1/4	5 1/4	3.50
3	1	1 3/4	3 1/4	5 1/4	3.50
4	2	1 1/4	3	4 1/2	4.00
5	2	1 1/2	3 1/4	5 1/4	4.00
6	2	1 3/4	3 1/4	5 1/4	4.00
7	3	1 1/2	3 1/4	5 1/4	4.75
8	3	1 3/4	3 1/4	5 1/4	4.75
9	3	2	3 1/2	6 1/4	4.75
10	4	2	3 1/2	6 1/4	5.30



### No. 100 T. SOLID SOCKETS

WITH MORSE TAPER  
HOLES.

Number	Morse Taper Hole, Number.	Diameter of Shank, Inches.	Length of Shank, Inches.	Whole Length, Inches.	Price Each.
1	1	1	3 1/2	3 1/2	\$2.00
2	1	1 1/4	3 1/2	3 1/2	2.00
3	1	1 1/2	3 1/2	3 1/2	2.00
4	2	1	3 5/8	4	2.65
5	2	1 1/4	3 5/8	4	2.65
6	2	1 1/2	3 5/8	4	2.65
7	2	1 3/4	3 5/8	4	2.65
8	2	2	3 5/8	4	2.65
9	3	1 1/4	4 1/8	4 3/4	3.55
10	3	1 1/2	4 1/8	4 3/4	3.55
11	3	1 3/4	4 1/8	4 3/4	3.55
12	3	2	4 1/8	4 3/4	3.55
13	4	1 1/2	4 5/8	6	4.10
14	4	1 3/4	4 5/8	6	4.10
15	4	2	4 5/8	6	4.10

The above listed Solid and Floating Sockets are for use in the turrets of Chucking Machines, Screw Machines and Boring Mills for holding Reamers and Arbors with Morse Taper Shanks.

Other sizes made to order.

# MORSE TWIST DRILL AND MACHINE CO.

## DISCOUNT SHEET.

### APPLYING TO DRILL SECTION

Pages 13 to 162 Inclusive.

#### ARBORS

Nos. 125, 125½, 125 A, 125½ A, 125 B, 125½ B, 125 C, 125 D, 125 E, 125 F, 125 G, 125 J, 125 K, 125 L, 125 M, 125 N.....	.....
No. 125 H.....	On application.

#### CHUCKS

No. 121 (1, 2).....	.....
No. 121 (0, 3, 4).....	.....
No. 122 (2).....	.....
No. 122 (3, 4).....	On application.
No. 122 C (2).....	On application.
No. 124.....	.....

CHUCK-JAWS No. 121½.....	Net.
--------------------------	------

CHUCK WRENCHES No. 121 A.....	On application.
-------------------------------	-----------------

#### COUNTERBORES FOR WOOD

Nos. 108 K, 108 L, 108 M.....	On application.
-------------------------------	-----------------

#### DRILLS

Nos. 102, 102½, 102 J, 104, 104 M, 104 N, 110, 111, 112; 114 B, 114½ B to and including 1½ inches diameter .....	.....
Nos. 102, 102½, 104, 104 M, 110, 111, 112, 114 B, 114½ B over 1½ inches diameter....	.....
No. 102, Pages 22 and 23, to and including 1¼ inches diameter .....	.....
No. 102, Pages 22 and 23 over 1¼ inches dia. ....	.....
Nos. 102 A, 102 B, 102 C, 104 A, 104 B, 104 D, 104 E, 104 K, 104 L.....	.....
Nos. 102 D, 104 C.....	On application.
Nos. 102 E, 104 F, to and including 38 M M dia. ....	.....
Nos. 102 E, 104 F, over 38 M M diameter. ....	.....
Nos. 102 F, 104 G, to and including 1½ in. dia. ....	.....
Nos. 102 F, 104 G, over 1½ inches diameter. ...	.....
Nos. 102 G, 104 H, to and including 1½ in. dia. ....	.....
Nos. 102 G, 104 H, over 1½ inches diameter. ...	.....
Nos. 102 H, 102½ H.....	.....

Continued on next page.

# MORSE TWIST DRILL AND MACHINE CO.

## DISCOUNT SHEET.

### DRILL SECTION (CONTINUED.)

#### DRILLS

Nos. 105, 105 A, 105 B, 105 C, 106, 107, 107 B

107 C, 114 A, 114 C, 114 E, 114 F, 114 G . . . . .

Nos. 102, 104, 105, 107, 109 E, LEFT HAND . . . On application

Nos. 108, 108 A, 108 B . . . . .

Nos. 108 C, 108 D, 108 E, 108 F, 108 G, 108 H

108 J, 108 N, 108 P, 108 R, 108 S, 108 T . . . On application.

Nos. 109, 109½ . . . . .

Nos. 109 E, 109½ E . . . . .

No. 114 D . . . . .

#### DRILLS IN SETS

Page 145 Revolving Set . . . . .

Pages 146-147, Nos. 1, 2, 3, 5, 6, 7, 8, 9, 10,

15, 16, 17, 18, 19 . . . . .

Page 146 Nos. 4 and 11 to 1½ inches . . . . .

Page 146 Nos. 4 and 11 over 1½ inches . . . . .

Pages 148 and 150 Nos. 12 and 12 A . . . . .

Pages 148 and 150 Nos. 13, 13 A, 14 . . . . .

Pages 150 and 151 Nos. 5 A, 6 A, 7 A, 8 A,

9 A, 5 B, 7 B, 8 B, 15 B, 18 B, 19 B . . . . .

#### FOLDING OR PORTABLE HOLDERS

Nos. 5 B, 7 B, 8 B, 15 B, 18 B, 19 B . . . . .

#### INDEXED CASES

Nos. 5 A, 6 A, 7 A, 8 A, 9 A, 12 A, 13 A . . . . .

REVOLVING DRILL STAND . . . . .

**No. 102½.****MORSE TAPER SHANK DRILLS**

FITTING ANDREW'S SOCKET.



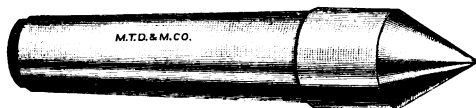
We purchased of M. L. Andrew, of Cincinnati, Ohio, his patents for Sockets or Chucks, and can furnish drills or other tools to fit them.

The above cut represents the shank of the drill used in the Andrew's Socket. The drills are held in place by the key in the socket. As the groove extends the entire length of the shank, there is no difficulty in PLACING the shank in the proper position.

The groove in the shank is deeper near the shoulder than at the outer end of the shank which prevents the drill from being pulled out of the socket as well as from turning in it.

Drills having shanks milled or fitted in this way are furnished at regular No. 102 list and discount.

For illustrations of Andrew's Sockets see page 9.

**No. 100L.****LATHE CENTERS.**

Morse Taper Shank.	Price Each.	Whole Length, Inches.	Length Body, Inches.
No. 0	\$ .50	2 $\frac{7}{8}$	$\frac{3}{4}$
No. 1	.60	3 $\frac{5}{16}$	1
No. 2	.75	4 $\frac{3}{16}$	1 $\frac{7}{16}$
No. 3	1.25	5 $\frac{1}{4}$	1 $\frac{7}{8}$
No. 4	1.75	6 $\frac{3}{4}$	2 $\frac{7}{16}$
No. 5	3.50	8 $\frac{1}{2}$	3 $\frac{1}{16}$

These Lathe Centers are made from Tool Steel, both ends being hardened. The shanks are ground to our standard tapers. Included angle of point is 60° and ground true. Other tapers made to order.

## No. 102.

## MORSE TAPER SHANK TWIST DRILLS

WITH INCREASE TWIST OR CONSTANT ANGLE.



Diameter, Inches.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.	Decimal Equivalent.	Morse Taper Shank.
$\frac{1}{16}$	\$ .35	$4\frac{3}{8}$	$1\frac{1}{4}$	.0625	No. 1.
$\frac{5}{64}$	.40	$4\frac{1}{2}$	$1\frac{3}{8}$	.0781	
$\frac{3}{32}$	.40	$4\frac{1}{2}$	$1\frac{1}{2}$	.0937	
$\frac{7}{64}$	.45	$4\frac{5}{8}$	$1\frac{11}{16}$	.1093	
$\frac{1}{8}$	.45	$5\frac{1}{8}$	$2\frac{3}{16}$	.125	
$\frac{9}{64}$	.45	$5\frac{1}{4}$	$2\frac{5}{16}$	.1406	
$\frac{5}{32}$	.45	$5\frac{3}{8}$	$2\frac{7}{16}$	.1562	
$\frac{3}{16}$	.50	$5\frac{1}{2}$	$2\frac{9}{16}$	.1718	
$\frac{13}{64}$	.50	$5\frac{3}{4}$	$2\frac{11}{16}$	.1875	
$\frac{7}{32}$	.55	$5\frac{7}{8}$	$2\frac{7}{8}$	.2031	
$\frac{15}{64}$	.55	6	3	.2187	
$\frac{1}{4}$	.60	$6\frac{1}{8}$	3	.2343	
$\frac{17}{64}$	.60	$6\frac{1}{8}$	3	.25	
$\frac{9}{32}$	.65	$6\frac{1}{4}$	$2\frac{15}{16}$	.2656	
$\frac{19}{64}$	.65	$6\frac{1}{4}$	$2\frac{15}{16}$	.2812	
$\frac{5}{16}$	.70	$6\frac{3}{8}$	$3\frac{1}{8}$	.2968	
$\frac{21}{64}$	.70	$6\frac{3}{8}$	$3\frac{1}{8}$	.3125	
$\frac{11}{32}$	.75	$6\frac{1}{2}$	$3\frac{3}{16}$	.3281	
$\frac{23}{64}$	.75	$6\frac{1}{2}$	$3\frac{3}{16}$	.3437	
$\frac{3}{8}$	.80	$6\frac{3}{4}$	$3\frac{7}{16}$	.3593	
$\frac{25}{64}$	.80	$6\frac{3}{4}$	$3\frac{7}{16}$	.375	
$\frac{13}{32}$	.85	7	$3\frac{11}{16}$	.3906	
$\frac{27}{64}$	.85	7	$3\frac{11}{16}$	.4062	
$\frac{7}{16}$	.90	$7\frac{1}{4}$	$3\frac{13}{16}$	.4218	
$\frac{29}{64}$	.90	$7\frac{1}{4}$	$3\frac{13}{16}$	.4375	
$\frac{15}{32}$	.95	$7\frac{1}{2}$	$4\frac{3}{16}$	.4531	
	.95	$7\frac{1}{2}$	$4\frac{3}{16}$	.4687	

For prices of Sets of Taper Shank Drills see pages 145, 146.



## No. 102.

## MORSE TAPER SHANK TWIST DRILLS

WITH INCREASE TWIST OR CONSTANT ANGLE.



Diameter, Inches.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.	Decimal Equivalent.	Morse Taper Shank.
$\frac{31}{64}$	\$1.00	$7\frac{3}{4}$	$4\frac{7}{8}$	.4843	No. 1.
$\frac{1}{2}$	1.00	$7\frac{3}{4}$	$4\frac{7}{8}$	.5	
$\frac{33}{64}$	1.10	8	$4\frac{11}{8}$	.5156	
$\frac{17}{32}$	1.10	8	$4\frac{11}{8}$	.5312	
$\frac{35}{64}$	1.20	$8\frac{1}{4}$	$4\frac{11}{8}$	.5468	
$\frac{9}{16}$	1.20	$8\frac{1}{4}$	$4\frac{11}{8}$	.5625	
$\frac{37}{64}$	1.30	$8\frac{1}{2}$	$4\frac{5}{8}$	.5781	No. 2.
$\frac{19}{32}$	1.30	$8\frac{1}{2}$	$4\frac{5}{8}$	.5937	
$\frac{39}{64}$	1.40	$8\frac{3}{4}$	$4\frac{7}{8}$	.6093	
$\frac{5}{8}$	1.40	$8\frac{3}{4}$	$4\frac{7}{8}$	.625	
$\frac{41}{64}$	1.50	9	$5\frac{1}{8}$	.6406	
$\frac{21}{32}$	1.50	9	$5\frac{1}{8}$	.6562	
$\frac{43}{64}$	1.60	$9\frac{1}{4}$	$5\frac{3}{8}$	.6718	
$\frac{11}{8}$	1.60	$9\frac{1}{4}$	$5\frac{3}{8}$	.6875	
$\frac{45}{64}$	1.70	$9\frac{1}{2}$	$5\frac{5}{8}$	.7031	
$\frac{23}{32}$	1.70	$9\frac{1}{2}$	$5\frac{5}{8}$	.7187	
$\frac{47}{64}$	1.85	$9\frac{3}{4}$	$5\frac{7}{8}$	.7343	
$\frac{3}{4}$	1.85	$9\frac{3}{4}$	$5\frac{7}{8}$	.75	
$\frac{49}{64}$	2.00	$9\frac{7}{8}$	6	.7656	
$\frac{25}{32}$	2.00	$9\frac{7}{8}$	6	.7812	
$\frac{51}{64}$	2.15	10	$6\frac{1}{8}$	.7968	
$\frac{13}{8}$	2.15	10	$6\frac{1}{8}$	.8125	
$\frac{53}{64}$	2.30	$10\frac{1}{4}$	$6\frac{3}{8}$	.8281	
$\frac{27}{32}$	2.30	$10\frac{1}{4}$	$6\frac{3}{8}$	.8437	
$\frac{55}{64}$	2.45	$10\frac{1}{2}$	$6\frac{5}{8}$	.8593	
$\frac{7}{8}$	2.45	$10\frac{1}{2}$	$6\frac{5}{8}$	.875	

## No. 102.

## MORSE TAPER SHANK TWIST DRILLS

WITH INCREASE TWIST OR CONSTANT ANGLE.



Diameter, Inches.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.	Decimal Equivalent.	Morse Taper Shank.
$\frac{5}{64}$	\$2.60	$10\frac{5}{8}$	$6\frac{3}{4}$	.8906	No. 2.
$\frac{3}{32}$	2.60	$10\frac{5}{8}$	$6\frac{3}{4}$	.9062	
$\frac{5}{64}$	2.75	$10\frac{3}{4}$	$6\frac{1}{8}$	.9218	
$\frac{1}{16}$	2.75	$10\frac{3}{4}$	$6\frac{1}{8}$	.9375	
$\frac{3}{64}$	2.90	$10\frac{7}{8}$	$6\frac{1}{4}$	.9531	
$\frac{1}{8}$	2.90	$10\frac{7}{8}$	$6\frac{1}{4}$	.9687	
$\frac{3}{32}$	3.00	11	$6\frac{3}{8}$	.9843	
1	3.00	11	$6\frac{3}{8}$	1.	No. 3.
$1\frac{1}{64}$	3.20	$11\frac{1}{8}$	$6\frac{1}{2}$	1.0156	
$1\frac{1}{32}$	3.20	$11\frac{1}{8}$	$6\frac{1}{2}$	1.0312	
$1\frac{3}{64}$	3.40	$11\frac{1}{4}$	$6\frac{5}{8}$	1.0468	
$1\frac{1}{16}$	3.40	$11\frac{1}{4}$	$6\frac{5}{8}$	1.0625	
$1\frac{5}{64}$	3.60	$11\frac{1}{2}$	$6\frac{7}{8}$	1.0781	
$1\frac{3}{32}$	3.60	$11\frac{1}{2}$	$6\frac{7}{8}$	1.0937	
$1\frac{7}{64}$	3.80	$11\frac{3}{4}$	$7\frac{1}{8}$	1.1093	
$1\frac{1}{8}$	3.80	$11\frac{3}{4}$	$7\frac{1}{8}$	1.125	
$1\frac{9}{64}$	4.00	$11\frac{7}{8}$	$7\frac{1}{4}$	1.1406	
$1\frac{5}{16}$	4.00	$11\frac{7}{8}$	$7\frac{1}{4}$	1.1562	
$1\frac{11}{64}$	4.20	12	$7\frac{3}{8}$	1.1718	
$1\frac{3}{16}$	4.20	12	$7\frac{3}{8}$	1.1875	
$1\frac{13}{64}$	4.40	$12\frac{1}{8}$	$7\frac{1}{2}$	1.2031	
$1\frac{7}{32}$	4.40	$12\frac{1}{8}$	$7\frac{1}{2}$	1.2187	
$1\frac{15}{64}$	4.50	$12\frac{1}{2}$	$7\frac{7}{8}$	1.2343	No. 4.
$1\frac{1}{4}$	4.50	$12\frac{1}{2}$	$7\frac{7}{8}$	1.25	
$1\frac{17}{64}$	4.65	$14\frac{1}{8}$	$8\frac{1}{2}$	1.2656	
$1\frac{9}{32}$	4.65	$14\frac{1}{8}$	$8\frac{1}{2}$	1.2812	

## No. 102.

## MORSE TAPER SHANK TWIST DRILLS

WITH INCREASE TWIST OR CONSTANT ANGLE.



Diameter, Inches.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.	Decimal Equivalent.	Morse Taper Shank.
$1\frac{1}{16}$	\$4.80	$14\frac{1}{4}$	$8\frac{5}{8}$	1.2968	No. 4.
$1\frac{5}{16}$	4.80	$14\frac{1}{4}$	$8\frac{5}{8}$	1.3125	
$1\frac{3}{8}$	5.00	$14\frac{3}{8}$	$8\frac{3}{4}$	1.3281	
$1\frac{7}{8}$	5.00	$14\frac{3}{8}$	$8\frac{3}{4}$	1.3437	
$1\frac{1}{2}$	5.20	$14\frac{1}{2}$	$8\frac{7}{8}$	1.3593	
$1\frac{5}{8}$	5.20	$14\frac{1}{2}$	$8\frac{7}{8}$	1.375	
$1\frac{3}{4}$	5.40	$14\frac{5}{8}$	9	1.3906	
$1\frac{7}{8}$	5.40	$14\frac{5}{8}$	9	1.4062	
$1\frac{1}{2}$	5.60	$14\frac{3}{4}$	$9\frac{1}{8}$	1.4218	
$1\frac{7}{8}$	5.60	$14\frac{3}{4}$	$9\frac{1}{8}$	1.4375	
$1\frac{1}{2}$	5.80	$14\frac{7}{8}$	$9\frac{1}{4}$	1.4531	
$1\frac{3}{4}$	5.80	$14\frac{7}{8}$	$9\frac{1}{4}$	1.4687	
$1\frac{1}{2}$	6.00	15	$9\frac{3}{8}$	1.4843	
$1\frac{1}{2}$	6.00	15	$9\frac{3}{8}$	1.5	
* $1\frac{1}{4}$	6.30	15	$9\frac{3}{8}$	1.5156	
$1\frac{1}{4}$	6.30	15	$9\frac{3}{8}$	1.5312	
$1\frac{3}{8}$	6.60	$15\frac{1}{4}$	$9\frac{5}{8}$	1.5468	
$1\frac{5}{8}$	6.60	$15\frac{1}{4}$	$9\frac{5}{8}$	1.5625	
$1\frac{3}{4}$	6.90	$15\frac{1}{4}$	$9\frac{5}{8}$	1.5781	
$1\frac{1}{2}$	6.90	$15\frac{1}{4}$	$9\frac{5}{8}$	1.5937	
$1\frac{1}{2}$	7.20	$15\frac{1}{2}$	$9\frac{7}{8}$	1.6093	
$1\frac{5}{8}$	7.20	$15\frac{1}{2}$	$9\frac{7}{8}$	1.625	
$1\frac{1}{4}$	7.50	$15\frac{1}{2}$	$9\frac{7}{8}$	1.6406	
$1\frac{1}{2}$	7.50	$15\frac{1}{2}$	$9\frac{7}{8}$	1.6562	
$1\frac{1}{4}$	7.80	$15\frac{3}{4}$	$10\frac{1}{8}$	1.6718	
$1\frac{1}{8}$	7.80	$15\frac{3}{4}$	$10\frac{1}{8}$	1.6875	
$1\frac{1}{4}$	8.10	$15\frac{3}{4}$	$10\frac{1}{8}$	1.7031	
$1\frac{3}{8}$	8.10	$15\frac{3}{4}$	$9\frac{11}{16}$	1.7187	
$1\frac{1}{2}$	8.40	16	$9\frac{11}{16}$	1.7343	
$1\frac{3}{4}$	8.40	16	$9\frac{11}{16}$	1.75	

\*Drills  $1\frac{1}{4}$  inches and larger take a different discount than  $1\frac{1}{2}$  inches and smaller.

## No. 102.

## MORSE TAPER SHANK TWIST DRILLS

WITH INCREASE TWIST OR CONSTANT ANGLE.



Diameter, Inches.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.	Decimal Equivalent.	Morse Taper Shank.
1 $\frac{1}{16}$	\$8.60	16	9 $\frac{1}{8}$	1.7656	No. 4.
1 $\frac{3}{32}$	8.60	16	9 $\frac{1}{8}$	1.7812	
1 $\frac{5}{16}$	8.80	16 $\frac{1}{4}$	10 $\frac{3}{16}$	1.7968	
1 $\frac{7}{16}$	8.80	16 $\frac{1}{4}$	10 $\frac{1}{8}$	1.8125	
1 $\frac{9}{16}$	9.00	16 $\frac{1}{4}$	10 $\frac{1}{8}$	1.8281	
1 $\frac{7}{8}$	9.00	16 $\frac{1}{4}$	10 $\frac{1}{8}$	1.8437	
1 $\frac{5}{8}$	9.20	16 $\frac{1}{2}$	10 $\frac{3}{8}$	1.8593	
1 $\frac{7}{8}$	9.20	16 $\frac{1}{2}$	10 $\frac{3}{8}$	1.875	
1 $\frac{7}{8}$	9.35	16 $\frac{1}{2}$	10 $\frac{3}{8}$	1.8906	
1 $\frac{7}{8}$	9.35	16 $\frac{1}{2}$	10 $\frac{3}{8}$	1.9062	
1 $\frac{7}{8}$	9.50	16 $\frac{1}{2}$	10 $\frac{3}{8}$	1.9218	
1 $\frac{7}{8}$	9.50	16 $\frac{1}{2}$	10 $\frac{1}{4}$	1.9375	
1 $\frac{7}{8}$	9.65	16 $\frac{1}{2}$	10 $\frac{1}{4}$	1.9531	
1 $\frac{7}{8}$	9.65	16 $\frac{1}{2}$	10 $\frac{1}{4}$	1.9687	
1 $\frac{7}{8}$	9.80	16 $\frac{1}{2}$	10 $\frac{1}{4}$	1.9843	
2	9.80	16 $\frac{1}{2}$	10 $\frac{1}{4}$	2.	
2 $\frac{1}{8}$	10.20	16 $\frac{1}{2}$	9 $\frac{1}{2}$	2.0156	No. 5.
2 $\frac{1}{8}$	10.20	16 $\frac{1}{2}$	9 $\frac{1}{2}$	2.0312	
2 $\frac{3}{16}$	10.60	17	10	2.0468	
2 $\frac{1}{4}$	10.60	17	10	2.0625	
2 $\frac{5}{16}$	10.90	17	10	2.0781	
2 $\frac{3}{8}$	10.90	17	10	2.0937	
2 $\frac{7}{16}$	11.20	17	10	2.1093	
2 $\frac{1}{2}$	11.20	17	10	2.125	
2 $\frac{5}{8}$	11.60	17	10	2.1406	
2 $\frac{3}{4}$	11.60	17	10	2.1562	
2 $\frac{7}{8}$	12.00	17	10	2.1718	
2 $\frac{15}{16}$	12.00	17	10	2.1875	
2 $\frac{1}{2}$	12.40	17 $\frac{1}{2}$	10 $\frac{1}{2}$	2.2031	

Drills 1  $\frac{1}{16}$  inches and larger take a different discount than 1  $\frac{1}{2}$  inches and smaller.

**No. 102.**  
**MORSE TAPER SHANK TWIST DRILLS**  
 WITH INCREASE TWIST OR CONSTANT ANGLE.



Diameter, Inches.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.	Decimal Equivalent.	Morse Taper Shank.
$2\frac{3}{32}$	\$12.40	$17\frac{1}{2}$	$10\frac{1}{2}$	2.2187	No. 5.
$2\frac{1}{8}$	12.80	$17\frac{1}{2}$	$10\frac{1}{2}$	2.2343	
$2\frac{1}{4}$	12.80	$17\frac{1}{2}$	$10\frac{1}{8}$	2.25	
$2\frac{1}{16}$	13.20	$17\frac{1}{2}$	$10\frac{1}{8}$	2.2656	
$2\frac{3}{32}$	13.20	$17\frac{1}{2}$	$10\frac{1}{8}$	2.2812	
$2\frac{1}{8}$	13.60	$17\frac{1}{2}$	$10\frac{1}{8}$	2.2968	
$2\frac{1}{16}$	13.60	$17\frac{1}{2}$	$10\frac{1}{8}$	2.3125	
$2\frac{3}{16}$	14.00	18	$10\frac{5}{8}$	2.3281	
$2\frac{1}{2}$	14.00	18	$10\frac{5}{8}$	2.3437	
$2\frac{3}{8}$	14.40	18	$10\frac{5}{8}$	2.3593	
$2\frac{3}{8}$	14.40	18	$10\frac{1}{2}$	2.375	
$2\frac{3}{4}$	14.70	$18\frac{1}{2}$	11	2.3906	
$2\frac{1}{2}$	14.70	$18\frac{1}{2}$	11	2.4062	
$2\frac{3}{4}$	15.00	$18\frac{1}{2}$	11	2.4218	
$2\frac{7}{8}$	15.00	$18\frac{1}{2}$	11	2.4375	
$2\frac{3}{4}$	15.30	19	$11\frac{1}{2}$	2.4531	
$2\frac{1}{2}$	15.30	19	$11\frac{1}{2}$	2.4687	
$2\frac{3}{4}$	15.60	19	$11\frac{1}{2}$	2.4843	
$2\frac{1}{2}$	15.60	19	$11\frac{3}{8}$	2.5	
$2\frac{3}{4}$	15.90	$19\frac{1}{4}$	$11\frac{5}{8}$	2.5156	
$2\frac{1}{2}$	15.90	$19\frac{1}{4}$	$11\frac{5}{8}$	2.5312	
$2\frac{3}{4}$	16.20	$19\frac{1}{4}$	$11\frac{5}{8}$	2.5468	
$2\frac{7}{8}$	16.20	$19\frac{1}{4}$	$11\frac{5}{8}$	2.5625	
$2\frac{3}{4}$	16.50	$19\frac{1}{2}$	$11\frac{7}{8}$	2.5781	
$2\frac{1}{2}$	16.50	$19\frac{1}{2}$	$11\frac{7}{8}$	2.5937	
$2\frac{3}{4}$	16.80	$19\frac{1}{2}$	$11\frac{7}{8}$	2.6093	
$2\frac{5}{8}$	16.80	$19\frac{1}{2}$	$11\frac{3}{4}$	2.625	
$2\frac{1}{2}$	17.20	20	$12\frac{1}{4}$	2.6406	
$2\frac{3}{4}$	17.20	20	$12\frac{1}{4}$	2.6562	
$2\frac{1}{2}$	17.60	20	$12\frac{1}{4}$	2.6718	

Drills  $1\frac{1}{16}$  inches and larger take a different discount than  $1\frac{1}{2}$  inches and smaller.

## No. 102.

## MORSE TAPER SHANK TWIST DRILLS

WITH INCREASE TWIST OR CONSTANT ANGLE.



Diameter, Inches.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.	Decimal Equivalent.	Morse Taper Shank.
2 $\frac{1}{16}$	\$17.60	20	12 $\frac{1}{4}$	2.6875	No. 5.
2 $\frac{3}{16}$	18.30	20 $\frac{1}{2}$	12 $\frac{3}{4}$	2.7031	
2 $\frac{1}{2}$	18.30	20 $\frac{1}{2}$	12 $\frac{3}{4}$	2.7187	
2 $\frac{7}{16}$	19.00	20 $\frac{1}{2}$	12 $\frac{3}{4}$	2.7343	
2 $\frac{3}{4}$	19.00	20 $\frac{1}{2}$	12 $\frac{5}{8}$	2.75	
2 $\frac{9}{16}$	19.50	20 $\frac{1}{2}$	12 $\frac{5}{8}$	2.7656	
2 $\frac{5}{8}$	19.50	20 $\frac{1}{2}$	12 $\frac{5}{8}$	2.7812	
2 $\frac{1}{4}$	20.00	20 $\frac{1}{2}$	12 $\frac{5}{8}$	2.7968	
2 $\frac{1}{8}$	20.00	20 $\frac{1}{2}$	12 $\frac{5}{8}$	2.8125	
2 $\frac{3}{8}$	20.50	21	13 $\frac{1}{8}$	2.8281	
2 $\frac{1}{2}$	20.50	21	13 $\frac{1}{8}$	2.8437	
2 $\frac{5}{8}$	21.00	21	13 $\frac{1}{8}$	2.8593	
2 $\frac{7}{8}$	21.00	21	13	2.875	
2 $\frac{9}{16}$	22.00	21	13	2.8906	
2 $\frac{3}{4}$	22.00	21	13	2.9062	
2 $\frac{5}{8}$	23.00	21	13	2.9218	
2 $\frac{1}{2}$	23.00	21	13	2.9375	
2 $\frac{1}{4}$	24.00	22	14	2.9531	
2 $\frac{3}{8}$	24.00	22	14	2.9687	
2 $\frac{1}{2}$	25.00	22	14	2.9843	
3	25.00	22	13 $\frac{7}{8}$	3.	No. 6.
3 $\frac{1}{16}$	28.00	24 $\frac{5}{16}$	14 $\frac{1}{2}$	3.0625	
3 $\frac{1}{8}$	31.00	24 $\frac{5}{16}$	14 $\frac{3}{8}$	3.1250	
3 $\frac{3}{16}$	34.00	24 $\frac{5}{16}$	14 $\frac{3}{8}$	3.1875	
3 $\frac{1}{4}$	37.00	24 $\frac{1}{2}$	14 $\frac{3}{4}$	3.2500	
3 $\frac{5}{16}$	40.00	24 $\frac{1}{2}$	14 $\frac{3}{4}$	3.3125	
3 $\frac{3}{8}$	43.00	24 $\frac{1}{2}$	14 $\frac{5}{8}$	3.3750	
3 $\frac{7}{16}$	46.00	24 $\frac{1}{2}$	14 $\frac{5}{8}$	3.4375	
3 $\frac{1}{2}$	49.50	25 $\frac{5}{16}$	15	3.5	
3 $\frac{9}{16}$	53.00	25 $\frac{5}{16}$	15	3.5625	
3 $\frac{5}{8}$	57.00	25 $\frac{5}{16}$	14 $\frac{7}{8}$	3.6250	
3 $\frac{1}{2}$	60.00	25 $\frac{5}{16}$	14 $\frac{7}{8}$	3.6875	

## No. 102.

## MORSE TAPER SHANK TWIST DRILLS

WITH INCREASE TWIST OR CONSTANT ANGLE



Diameter, Inches.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.	Decimal Equivalent.	Morse Taper Shank.
3¾	63.00	25½	15¼	3.75	No. 6.
3⅞	66.00	25½	15¼	3.8125	
3⅞	69.00	25½	15⅛	3.8750	
3⅞	72.00	25½	15⅛	3.9375	
4	75.00	25½	15⅛	4.	
4⅛	78.00	25½	15	4.0625	
4⅛	81.00	25½	15	4.1250	
4⅛	84.00	25½	15	4.1875	
4¼	87.00	25½	15	4.25	
4⅝	90.50	25½	15	4.3125	
4⅝	94.00	25½	15	4.3750	
4⅝	97.50	25½	15	4.4375	
4½	101.00	26½	16	4.5	
4⅞	103.50	26½	16	4.5625	
4⅞	107.00	26½	16	4.6250	
4⅞	110.50	26½	16	4.6875	
4¾	114.00	26½	16	4.75	
4⅞	117.50	26½	16	4.8125	
4⅞	121.00	26½	16	4.8750	
4⅞	124.50	26½	16	4.9375	
5	128.00	27½	17	5.	
5⅛	134.00	27½	17	5.1250	
5¼	140.00	27½	17	5.25	
5⅝	146.00	27½	17	5.3750	
5½	152.00	28½	18	5.5	
5⅝	158.00	28½	18	5.6250	
5¾	164.00	28½	18	5.75	
5⅞	170.00	28½	18	5.8750	
6	176.00	28½	18	6.	

For sizes larger than 2 inches we do not recommend Two-Groove Drills. We would call special attention to our Three and Four-Groove Drills listed on pages 94, 111 which we think will enable customers to obtain much more satisfactory results.

For No. 102½ see page 13 ; No. 102 A, 118, 102 B, 122 102 C, 126, 102 D, 115.

## No. 102.

## MORSE TAPER SHANK TWIST DRILLS

WITH INCREASE TWIST OR CONSTANT ANGLE.



Shanks larger than regular.

Diameter, Inches.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.	Decimal Equivalents.	Morse Taper Shank.
$\frac{5}{16}$	\$1.40	$6\frac{1}{2}$	$2\frac{5}{8}$	.3125	No. 2
$\frac{3}{8}$	1.40	$6\frac{3}{4}$	$2\frac{7}{8}$	.3281	
$\frac{7}{16}$	1.40	$6\frac{3}{4}$	$2\frac{7}{8}$	.3437	
$\frac{1}{2}$	1.40	7	$3\frac{1}{8}$	.3593	
$\frac{9}{16}$	1.40	7	$3\frac{1}{8}$	.375	
$\frac{5}{8}$	1.40	$7\frac{1}{4}$	$3\frac{3}{8}$	.3906	
$\frac{3}{4}$	1.40	$7\frac{1}{4}$	$3\frac{3}{8}$	.4062	
$\frac{7}{8}$	1.40	$7\frac{1}{2}$	$3\frac{5}{8}$	.4218	
$\frac{1}{2}$	1.40	$7\frac{1}{2}$	$3\frac{5}{8}$	.4375	
$\frac{13}{16}$	1.45	$7\frac{3}{4}$	$3\frac{7}{8}$	.4531	
$\frac{7}{8}$	1.45	$7\frac{3}{4}$	$3\frac{7}{8}$	.4687	
$\frac{15}{16}$	1.45	8	$4\frac{1}{8}$	.4843	
$\frac{1}{2}$	1.45	8	$4\frac{1}{8}$	.5	
$\frac{33}{64}$	1.50	$8\frac{1}{4}$	$4\frac{3}{8}$	.5156	
$\frac{17}{32}$	1.50	$8\frac{1}{4}$	$4\frac{3}{8}$	.5312	
$\frac{35}{64}$	1.50	$8\frac{1}{2}$	$4\frac{5}{8}$	.5468	
$\frac{9}{16}$	1.50	$8\frac{1}{2}$	$4\frac{5}{8}$	.5625	
$\frac{37}{64}$	2.50	$9\frac{3}{8}$	$4\frac{3}{4}$	.5781	No. 3
$\frac{19}{32}$	2.50	$9\frac{3}{8}$	$4\frac{3}{4}$	.5937	
$\frac{39}{64}$	2.50	$9\frac{1}{2}$	$4\frac{7}{8}$	.6093	
$\frac{5}{8}$	2.50	$9\frac{1}{2}$	$4\frac{7}{8}$	.625	
$\frac{41}{64}$	2.50	$9\frac{5}{8}$	5	.6406	
$\frac{21}{32}$	2.50	$9\frac{5}{8}$	5	.6562	
$\frac{43}{64}$	2.50	$9\frac{3}{4}$	$5\frac{1}{8}$	.6718	
$\frac{11}{16}$	2.50	$9\frac{3}{4}$	$5\frac{1}{8}$	.6875	
$\frac{45}{64}$	2.60	$9\frac{7}{8}$	$5\frac{1}{4}$	.7031	
$\frac{23}{32}$	2.60	$9\frac{7}{8}$	$5\frac{1}{4}$	.7187	
$\frac{47}{64}$	2.60	10	$5\frac{3}{8}$	.7343	
$\frac{3}{4}$	2.60	10	$5\frac{3}{8}$	.75	
$\frac{49}{64}$	2.60	$10\frac{1}{8}$	$5\frac{1}{2}$	.7656	
$\frac{25}{32}$	2.60	$10\frac{1}{8}$	$5\frac{1}{2}$	.7812	
$\frac{51}{64}$	2.70	$10\frac{1}{4}$	$5\frac{5}{8}$	.7968	
$\frac{13}{16}$	2.70	$10\frac{1}{4}$	$5\frac{5}{8}$	.8125	



**No. 102.**  
**MORSE TAPER SHANK TWIST DRILLS**  
 WITH INCREASE TWIST OR CONSTANT ANGLE.



Shanks larger than regular.

Diameter, Inches.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.	Decimal Equivalent.	Morse Taper Shank
$\frac{3}{32}$	\$2.70	$10\frac{3}{8}$	$5\frac{3}{4}$	.8281	No. 3.
$\frac{7}{32}$	2.70	$10\frac{3}{8}$	$5\frac{3}{4}$	.8437	
$\frac{9}{32}$	2.75	$10\frac{1}{2}$	$5\frac{7}{8}$	.8593	
$\frac{1}{8}$	2.75	$10\frac{1}{2}$	$5\frac{7}{8}$	.875	
$\frac{5}{16}$	2.80	$10\frac{5}{8}$	6	.8906	
$\frac{3}{8}$	2.80	$10\frac{5}{8}$	6	.9062	
$1\frac{1}{8}$	4.60	12	$6\frac{3}{8}$	1.125	No. 4.
$1\frac{1}{4}$	4.65	$12\frac{1}{4}$	$6\frac{5}{8}$	1.1406	
$1\frac{3}{8}$	4.65	$12\frac{1}{4}$	$6\frac{5}{8}$	1.1562	
$1\frac{1}{2}$	4.70	$12\frac{1}{2}$	$6\frac{7}{8}$	1.1718	
$1\frac{3}{4}$	4.70	$12\frac{1}{2}$	$6\frac{7}{8}$	1.1875	
$1\frac{5}{8}$	4.75	$12\frac{3}{4}$	$7\frac{1}{8}$	1.2031	
$1\frac{7}{8}$	4.75	$12\frac{3}{4}$	$7\frac{1}{8}$	1.2187	
$1\frac{9}{8}$	4.80	13	$7\frac{3}{8}$	1.2343	
$1\frac{1}{4}$	4.80	13	$7\frac{3}{8}$	1.25	No. 5.
$1\frac{3}{4}$	8.40	$16\frac{1}{2}$	$9\frac{5}{8}$	1.7343	
$1\frac{1}{2}$	8.40	$16\frac{1}{2}$	$9\frac{5}{8}$	1.75	
$1\frac{1}{8}$	8.60	$16\frac{1}{2}$	$9\frac{5}{8}$	1.7656	
$1\frac{3}{8}$	8.60	$16\frac{1}{2}$	$9\frac{5}{8}$	1.7812	
$1\frac{1}{4}$	8.80	$16\frac{1}{2}$	$9\frac{5}{8}$	1.7968	
$1\frac{1}{8}$	8.80	$16\frac{1}{2}$	$9\frac{5}{8}$	1.8125	
$1\frac{3}{8}$	9.00	$16\frac{1}{2}$	$9\frac{5}{8}$	1.8281	
$1\frac{1}{2}$	9.00	$16\frac{1}{2}$	$9\frac{5}{8}$	1.8437	
$1\frac{3}{4}$	9.20	$16\frac{1}{2}$	$9\frac{5}{8}$	1.8593	
$1\frac{7}{8}$	9.20	$16\frac{1}{2}$	$9\frac{5}{8}$	1.875	
$1\frac{5}{4}$	9.35	$16\frac{1}{2}$	$9\frac{5}{8}$	1.8906	
$1\frac{3}{8}$	9.35	$16\frac{1}{2}$	$9\frac{5}{8}$	1.9062	
$1\frac{1}{4}$	9.50	$16\frac{1}{2}$	$9\frac{5}{8}$	1.9218	
$1\frac{1}{8}$	9.50	$16\frac{1}{2}$	$9\frac{5}{8}$	1.9375	
$1\frac{3}{4}$	9.65	$16\frac{1}{2}$	$9\frac{5}{8}$	1.9531	
$1\frac{1}{2}$	9.65	$16\frac{1}{2}$	$9\frac{5}{8}$	1.9687	
$1\frac{1}{4}$	9.80	$16\frac{1}{2}$	$9\frac{5}{8}$	1.9843	
2	9.80	$16\frac{1}{2}$	$9\frac{5}{8}$	2.	

**No. 102E.****MORSE TAPER SHANK TWIST DRILLS**

WITH INCREASE TWIST OR CONSTANT ANGLE.

MILLIMETER SIZES.



Diameter, M. M.	Price Each.	Diameter in Decimals of 1 Inch.	Whole Length, M. M.	Twist Cut, M. M.	Morse Taper Shank.
1	\$ .35	.0394	92	16	No. 1.
1½	.35	.0591	98	21	
2	.40	.0787	105	28	
2½	.40	.0984	111	34	
3	.45	.1181	116	43	
3½	.45	.1378	130	56	
4	.45	.1575	137	62	
4½	.50	.1771	140	65	
5	.55	.1968	149	73	
5½	.55	.2165	152	76	
6	.60	.2362	156	76	
6½	.65	.2559	156	76	
7	.65	.2756	159	75	
7½	.70	.2953	162	78	
8	.75	.3149	162	78	
8½	.75	.3346	165	81	
9	.80	.3543	172	87	
9½	.80	.3740	172	87	
10	.85	.3937	178	94	
10½	.90	.4134	184	100	
11	.90	.4330	184	100	
11½	.95	.4527	191	106	
12	1.00	.4724	191	106	
12½	1.00	.4921	197	113	
13	1.10	.5118	203	119	
13½	1.20	.5315	203	119	
14	1.20	.5512	210	125	

**No. 102 E.****MORSE TAPER SHANK TWIST DRILLS**

WITH INCREASE TWIST OR CONSTANT ANGLE.

MILLIMETER SIZES.



Diameter, M. M.	Price Each.	Diameter in Decimals of 1 Inch.	Whole Length, M. M.	Twist Cut, M. M.	Morse Taper Shank.
14½	\$1.30	.5708	216	117	No. 2.
15	1.30	.5905	216	117	
15½	1.40	.6102	222	124	
16	1.50	.6299	222	124	
16½	1.50	.6496	229	130	
17	1.60	.6693	235	137	
17½	1.70	.6890	235	137	
18	1.70	.7086	241	143	
18½	1.85	.7283	247	149	
19	1.85	.7480	247	149	
19½	2.00	.7677	251	152	
20	2.15	.7874	254	156	
20½	2.15	.8071	254	156	
21	2.30	.8267	260	162	
21½	2.45	.8464	260	162	
22	2.45	.8661	267	168	No. 3.
22½	2.60	.8858	270	171	
23	2.60	.9055	270	171	
23½	2.75	.9252	273	156	
24	2.90	.9449	276	159	
24½	2.90	.9646	276	159	
25	3.00	.9842	279	162	
25½	3.20	1.0039	279	162	
26	3.20	1.0236	282	165	
26½	3.40	1.0433	286	168	

## No. 102E.

## MORSE TAPER SHANK TWIST DRILLS

WITH INCREASE TWIST OR CONSTANT ANGLE.

MILLIMETER SIZES.



Diameter, M. M.	Price Each.	Diameter in Decimals of 1 Inch.	Whole Length, M. M.	Twist Cut, M. M.	Morse Taper Shank.
27	\$3.60	1.0629	286	168	No. 3.
27 ½	3.60	1.0827	292	175	
28	3.80	1.1024	298	181	
28 ½	3.80	1.1220	298	181	
29	4.00	1.1417	302	184	
29 ½	4.20	1.1614	302	184	
30	4.20	1.1811	305	187	
30 ½	4.40	1.2008	308	190	
31	4.50	1.2205	308	190	
31 ½	4.50	1.2401	317	200	
32	4.65	1.2598	317	200	
32 ½	4.65	1.2795	359	216	No. 4.
33	4.80	1.2992	362	219	
33 ½	5.00	1.3190	365	222	
34	5.00	1.3386	365	222	
34 ½	5.20	1.3583	368	225	
35	5.20	1.3779	368	225	
35 ½	5.40	1.3977	372	229	
36	5.60	1.4173	375	232	
36 ½	5.60	1.4370	375	232	
37	5.80	1.4567	378	235	
37 ½	6.00	1.4764	381	238	
38	6.00	1.4961	381	238	
*38 ½	6.30	1.5157	381	238	

\*Drills 38 ½ M. M. and larger take a different discount than 38 M. M. and smaller

## No. 102E.

## MORSE TAPER SHANK TWIST DRILLS

WITH INCREASE TWIST OR CONSTANT ANGLE.

MILLIMETER SIZES.



Diameter, M. M.	Price Each.	Diameter in Decimals of 1 Inch.	Whole Length, M. M.	Twist Cut, M. M.	Morse Taper Shank.
39	\$6.60	1.5354	381	238	} No. 4.
39½	6.60	1.5551	387	244	
40	6.90	1.5748	387	244	
40½	6.90	1.5945	387	244	
41	7.20	1.6142	394	251	
41½	7.50	1.6338	394	251	
42	7.50	1.6536	394	251	
42½	7.80	1.6733	400	257	
43	8.10	1.6929	400	257	
43½	8.10	1.7126	400	246	
44	8.40	1.7323	406	252	
44½	8.40	1.7519	406	252	
45	8.60	1.7717	406	252	
45½	8.80	1.7914	413	259	
46	8.80	1.8110	413	257	
46½	9.00	1.8307	413	257	
47	9.20	1.8504	419	264	
47½	9.20	1.8701	419	264	
48	9.35	1.8898	419	264	
48½	9.35	1.9094	419	264	
49	9.50	1.9291	419	260	
49½	9.65	1.9488	419	260	
50	9.65	1.9685	419	260	
50½	9.80	1.9882	419	260	

Drills 38½ M. M. and larger take a different discount than 38 M. M. and smaller.

## No. 102 E.

## MORSE TAPER SHANK TWIST DRILLS

WITH INCREASE TWIST OR CONSTANT ANGLE.

MILLIMETER SIZES.



Diameter, M. M.	Price Each.	Diameter in Decimals of 1 Inch.	Whole Length, M. M.	Twist Cut, M. M.	Morse Taper Shank.
51	\$10.20	2.0079	410	241	No. 5.
51½	10.20	2.0276	410	241	
52	10.60	2.0473	432	254	
52½	10.60	2.0670	432	254	
53	10.90	2.0866	432	254	
53½	11.20	2.1063	432	254	
54	11.20	2.1259	432	254	
54½	11.60	2.1456	432	254	
55	12.00	2.1654	432	254	
55½	12.00	2.1851	432	254	
56	12.40	2.2047	445	267	
56½	12.80	2.2244	445	267	
57	12.80	2.2441	445	257	
57½	13.20	2.2637	445	257	
58	13.60	2.2835	445	257	
58½	13.60	2.3031	445	257	
59	14.00	2.3228	457	270	
59½	14.40	2.3425	457	270	
60	14.40	2.3622	457	270	
60½	14.70	2.3819	470	279	
61	14.70	2.4015	470	279	
61½	15.00	2.4212	470	279	
62	15.30	2.4409	470	279	
62½	15.30	2.4606	483	292	
63	15.60	2.4803	483	292	

Drills 38½ M. M. and larger take a different discount than 38 M. M. and smaller.

## No. 102E.

## MORSE TAPER SHANK TWIST DRILLS

WITH INCREASE TWIST OR CONSTANT ANGLE.

MILLIMETER SIZES.



Diameter, M. M.	Price Each.	Diameter in Decimals of 1 inch	Whole Length, M. M.	Twist Cut, M. M.	Morse Taper Shank.
63½	\$15.60	2.5000	483	289	No. 5.
64	15.90	2.5197	489	295	
64½	15.90	2.5393	489	295	
65	16.20	2.5591	489	295	
65½	16.50	2.5787	495	302	
66	16.80	2.5984	495	302	
66½	16.80	2.6181	495	298	
67	17.20	2.6378	508	311	
67½	17.20	2.6574	508	311	
68	17.60	2.6772	508	311	
68½	18.30	2.6969	521	324	
69	18.30	2.7165	521	324	
69½	19.00	2.7362	521	324	
70	19.00	2.7559	521	321	
70½	19.50	2.7756	521	321	
71	20.00	2.7952	521	321	
71½	20.00	2.8149	521	321	
72	20.50	2.8347	533	333	
72½	21.00	2.8543	533	333	
73	21.00	2.8740	533	330	
73½	22.00	2.8937	533	330	
74	23.00	2.9134	533	330	
74½	23.00	2.9330	533	330	
75	24.00	2.9527	559	356	
75½	25.00	2.9724	559	356	
76	25.00	2.9921	559	352	

Drills 38½ M. M. and larger take a different discount than 38 M. M. and smaller.  
For 102 F see page 94; 102 G, 104; 102 H, 112.

## No. 102 J.

## REAMER DRILLS

WITH MORSE TAPER SHANKS.



Diameter, Inches.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.	To Precede Reamer, Size.	Morse Taper Shank.
.245	\$ .60	6 $\frac{1}{8}$	3	$\frac{1}{4}$	} No. 1.
.276	.65	6 $\frac{1}{4}$	2 $\frac{15}{16}$	$\frac{9}{32}$	
.306	.70	6 $\frac{3}{8}$	3 $\frac{1}{16}$	$\frac{5}{16}$	
.337	.75	6 $\frac{1}{2}$	3 $\frac{3}{16}$	$\frac{11}{32}$	
.369	.80	6 $\frac{3}{4}$	3 $\frac{7}{16}$	$\frac{3}{8}$	
.400	.85	7	3 $\frac{11}{16}$	$\frac{13}{32}$	
.429	.90	7 $\frac{1}{4}$	3 $\frac{15}{16}$	$\frac{7}{16}$	
.462	.95	7 $\frac{1}{2}$	4 $\frac{3}{16}$	$\frac{15}{32}$	
.492	1.00	7 $\frac{3}{4}$	4 $\frac{7}{16}$	$\frac{1}{2}$	
.554	1.20	8 $\frac{1}{4}$	4 $\frac{15}{16}$	$\frac{9}{16}$	
.615	1.40	8 $\frac{3}{4}$	4 $\frac{7}{8}$	$\frac{5}{8}$	} No. 2.
.677	1.60	9 $\frac{1}{4}$	5 $\frac{3}{8}$	$\frac{11}{16}$	
.740	1.85	9 $\frac{3}{4}$	5 $\frac{7}{8}$	$\frac{3}{4}$	
.802	2.15	10	6 $\frac{1}{8}$	$\frac{13}{16}$	
.865	2.45	10 $\frac{1}{2}$	6 $\frac{5}{8}$	$\frac{7}{8}$	
.927	2.75	10 $\frac{3}{4}$	6 $\frac{1}{8}$	$\frac{15}{16}$	} No. 3.
.990	3.00	11	6 $\frac{3}{8}$	1	

For Reamer Drills larger than one inch we recommend the use of Three or Four-Groove Drills listed on pages 94, 111.

No. 103 was formerly used to designate American Taper Shank Drills. Should a customer require them the price and discount would be the same as No. 102.



## No. 104.

## STRAIGHT SHANK TAPER LENGTH TWIST DRILLS

WITH INCREASE TWIST OR CONSTANT ANGLE.



Diameter, Inches.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.	Decimal Equivalent.
$\frac{1}{16}$	\$ .35	3	$1\frac{1}{4}$	.0625
$\frac{5}{64}$	.40	$3\frac{3}{4}$	$1\frac{3}{8}$	.0781
$\frac{3}{32}$	.40	$4\frac{1}{4}$	$1\frac{5}{8}$	.0937
$\frac{7}{64}$	.45	$4\frac{5}{8}$	$2\frac{1}{4}$	.1093
$\frac{1}{8}$	.45	$5\frac{1}{8}$	$2\frac{1}{2}$	.125
$\frac{9}{64}$	.45	$5\frac{1}{4}$	$2\frac{3}{4}$	.1406
$\frac{5}{32}$	.45	$5\frac{3}{8}$	3	.1562
$\frac{11}{64}$	.50	$5\frac{1}{2}$	$3\frac{1}{4}$	.1718
$\frac{3}{16}$	.50	$5\frac{3}{4}$	$3\frac{1}{2}$	.1875
$\frac{13}{64}$	.55	$5\frac{7}{8}$	$3\frac{3}{4}$	.2031
$\frac{7}{32}$	.55	6	4	.2187
$\frac{15}{64}$	.60	$6\frac{1}{8}$	4	.2343
$\frac{1}{4}$	.60	$6\frac{1}{8}$	4	.25
$\frac{17}{64}$	.65	$6\frac{1}{4}$	4	.2656
$\frac{9}{32}$	.65	$6\frac{1}{4}$	4	.2812
$\frac{19}{64}$	.70	$6\frac{3}{8}$	$4\frac{1}{8}$	.2968
$\frac{1}{8}$	.70	$6\frac{3}{8}$	$4\frac{1}{8}$	.3125
$\frac{21}{64}$	.75	$6\frac{1}{2}$	$4\frac{1}{8}$	.3281
$\frac{11}{32}$	.75	$6\frac{1}{2}$	$4\frac{1}{8}$	.3437
$\frac{23}{64}$	.80	$6\frac{3}{4}$	$4\frac{1}{4}$	.3593
$\frac{3}{8}$	.80	$6\frac{3}{4}$	$4\frac{1}{4}$	.375
$\frac{25}{64}$	.85	7	$4\frac{3}{8}$	.3906
$\frac{13}{32}$	.85	7	$4\frac{3}{8}$	.4062
$\frac{27}{64}$	.90	$7\frac{1}{4}$	$4\frac{5}{8}$	.4218
$\frac{7}{16}$	.90	$7\frac{1}{4}$	$4\frac{5}{8}$	.4375
$\frac{29}{64}$	.95	$7\frac{1}{2}$	$4\frac{7}{8}$	.4531
$\frac{15}{32}$	.95	$7\frac{1}{2}$	$4\frac{7}{8}$	.4687
$\frac{31}{64}$	1.00	$7\frac{3}{4}$	5	.4843

For prices of Sets of Straight Shank Drills see pages 146.

## No. 104.

## STRAIGHT SHANK TAPER LENGTH TWIST DRILLS

WITH INCREASE TWIST OR CONSTANT ANGLE.



Diameter, Inches.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.	Decimal Equivalent.
$\frac{1}{2}$	\$1.00	$7\frac{3}{4}$	5	.5
$\frac{3}{8}$	1.10	8	$5\frac{1}{4}$	.5156
$\frac{1}{2}$	1.10	8	$5\frac{1}{4}$	.5312
$\frac{5}{8}$	1.20	$8\frac{1}{4}$	$5\frac{3}{8}$	.5468
$\frac{3}{4}$	1.20	$8\frac{1}{4}$	$5\frac{3}{8}$	.5625
$\frac{7}{8}$	1.30	$8\frac{1}{2}$	$5\frac{5}{8}$	.5781
$\frac{1}{2}$	1.30	$8\frac{1}{2}$	$5\frac{5}{8}$	.5937
$\frac{3}{4}$	1.40	$8\frac{3}{4}$	$5\frac{3}{4}$	.6093
$\frac{5}{8}$	1.40	$8\frac{3}{4}$	$5\frac{3}{4}$	.625
$\frac{1}{2}$	1.50	9	$5\frac{7}{8}$	.6406
$\frac{3}{4}$	1.50	9	$5\frac{7}{8}$	.6562
$\frac{1}{2}$	1.60	$9\frac{1}{4}$	6	.6718
$\frac{3}{4}$	1.60	$9\frac{1}{4}$	6	.6875
$\frac{1}{2}$	1.70	$9\frac{1}{2}$	$6\frac{1}{8}$	.7031
$\frac{3}{4}$	1.70	$9\frac{1}{2}$	$6\frac{1}{8}$	.7187
$\frac{1}{2}$	1.85	$9\frac{3}{4}$	$6\frac{3}{8}$	.7343
$\frac{3}{4}$	1.85	$9\frac{3}{4}$	$6\frac{3}{8}$	.75
$\frac{1}{2}$	2.00	$9\frac{7}{8}$	$6\frac{1}{2}$	.7656
$\frac{3}{4}$	2.00	$9\frac{7}{8}$	$6\frac{1}{2}$	.7812
$\frac{1}{2}$	2.15	10	$6\frac{5}{8}$	.7968
$\frac{3}{4}$	2.15	10	$6\frac{5}{8}$	.8125
$\frac{1}{2}$	2.30	$10\frac{1}{4}$	$6\frac{3}{4}$	.8281
$\frac{3}{4}$	2.30	$10\frac{1}{4}$	$6\frac{3}{4}$	.8437
$\frac{1}{2}$	2.45	$10\frac{1}{2}$	7	.8593
$\frac{3}{4}$	2.45	$10\frac{1}{2}$	7	.875
$\frac{1}{2}$	2.60	$10\frac{5}{8}$	7	.8906
$\frac{3}{4}$	2.60	$10\frac{5}{8}$	7	.9062
$\frac{1}{2}$	2.75	$10\frac{3}{4}$	7	.9218

## No. 104.

## STRAIGHT SHANK TAPER LENGTH TWIST DRILLS

WITH INCREASE TWIST OR CONSTANT ANGLE.



Diameter, Inches.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.	Decimal Equivalent.
$\frac{15}{16}$	\$2.75	$10\frac{3}{4}$	7	.9375
$\frac{81}{64}$	2.90	$10\frac{7}{8}$	$7\frac{1}{8}$	.9531
$\frac{31}{32}$	2.90	$10\frac{7}{8}$	$7\frac{1}{8}$	.9687
$\frac{83}{64}$	3.00	11	$7\frac{3}{16}$	.9843
1	3.00	11	$7\frac{3}{16}$	1.
$1\frac{1}{64}$	3.20	$11\frac{1}{8}$	$7\frac{5}{16}$	1.0156
$1\frac{1}{32}$	3.20	$11\frac{1}{8}$	$7\frac{5}{16}$	1.0312
$1\frac{3}{64}$	3.40	$11\frac{1}{4}$	$7\frac{3}{8}$	1.0468
$1\frac{1}{16}$	3.40	$11\frac{1}{4}$	$7\frac{3}{8}$	1.0625
$1\frac{5}{64}$	3.60	$11\frac{1}{2}$	$7\frac{5}{8}$	1.0781
$1\frac{3}{32}$	3.60	$11\frac{1}{2}$	$7\frac{5}{8}$	1.0937
$1\frac{7}{64}$	3.80	$11\frac{3}{4}$	$7\frac{7}{8}$	1.1093
$1\frac{1}{8}$	3.80	$11\frac{3}{4}$	$7\frac{7}{8}$	1.125
$1\frac{9}{64}$	4.00	$11\frac{7}{8}$	8	1.1406
$1\frac{5}{32}$	4.00	$11\frac{7}{8}$	8	1.1562
$1\frac{11}{64}$	4.20	12	$8\frac{1}{8}$	1.1718
$1\frac{3}{16}$	4.20	12	$8\frac{1}{8}$	1.1875
$1\frac{13}{64}$	4.40	$12\frac{1}{8}$	$8\frac{1}{8}$	1.2031
$1\frac{1}{2}$	4.40	$12\frac{1}{8}$	$8\frac{1}{8}$	1.2187
$1\frac{15}{64}$	4.50	$12\frac{1}{2}$	$8\frac{1}{2}$	1.2343
$1\frac{1}{4}$	4.50	$12\frac{1}{2}$	$8\frac{1}{2}$	1.25
$1\frac{17}{64}$	4.65	$14\frac{1}{8}$	$9\frac{1}{8}$	1.2656
$1\frac{9}{32}$	4.65	$14\frac{1}{8}$	$9\frac{1}{8}$	1.2812
$1\frac{19}{64}$	4.80	$14\frac{1}{4}$	$9\frac{1}{4}$	1.2968
$1\frac{1}{16}$	4.80	$14\frac{1}{4}$	$9\frac{1}{4}$	1.3125
$1\frac{21}{64}$	5.00	$14\frac{3}{8}$	$9\frac{3}{8}$	1.3281
$1\frac{11}{32}$	5.00	$14\frac{3}{8}$	$9\frac{3}{8}$	1.3437
$1\frac{23}{64}$	5.20	$14\frac{1}{2}$	$9\frac{1}{2}$	1.3593

## No. 104.

## STRAIGHT SHANK TAPER LENGTH TWIST DRILLS

WITH INCREASE TWIST OR CONSTANT ANGLE.



Diameter, Inches.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.	Decimal Equivalent.
$1\frac{3}{8}$	\$5.20	$14\frac{1}{2}$	$9\frac{1}{2}$	1.375
$1\frac{7}{8}$	5.40	$14\frac{5}{8}$	$9\frac{1}{2}$	1.3906
$1\frac{1}{2}$	5.40	$14\frac{5}{8}$	$9\frac{1}{2}$	1.4062
$1\frac{3}{4}$	5.60	$14\frac{3}{4}$	$9\frac{5}{8}$	1.4218
$1\frac{7}{8}$	5.60	$14\frac{3}{4}$	$9\frac{5}{8}$	1.4375
$1\frac{29}{32}$	5.80	$14\frac{7}{8}$	$9\frac{3}{4}$	1.4531
$1\frac{15}{16}$	5.80	$14\frac{7}{8}$	$9\frac{3}{4}$	1.4687
$1\frac{31}{32}$	6.00	15	$9\frac{7}{8}$	1.4843
$1\frac{1}{2}$	6.00	15	$9\frac{7}{8}$	1.5
* $1\frac{33}{64}$	6.30	15	$9\frac{1}{2}$	1.5156
$1\frac{17}{32}$	6.30	15	$9\frac{1}{2}$	1.5312
$1\frac{35}{64}$	6.60	$15\frac{1}{4}$	$9\frac{3}{4}$	1.5468
$1\frac{9}{16}$	6.60	$15\frac{1}{4}$	$9\frac{3}{4}$	1.5625
$1\frac{37}{64}$	6.90	$15\frac{1}{4}$	$9\frac{3}{4}$	1.5781
$1\frac{19}{32}$	6.90	$15\frac{1}{4}$	$9\frac{3}{4}$	1.5937
$1\frac{41}{64}$	7.20	$15\frac{1}{2}$	10	1.6093
$1\frac{5}{8}$	7.20	$15\frac{1}{2}$	10	1.625
$1\frac{43}{64}$	7.50	$15\frac{1}{2}$	10	1.6406
$1\frac{21}{32}$	7.50	$15\frac{1}{2}$	10	1.6562
$1\frac{45}{64}$	7.80	$15\frac{3}{4}$	$10\frac{1}{4}$	1.6718
$1\frac{11}{8}$	7.80	$15\frac{3}{4}$	$10\frac{1}{4}$	1.6875
$1\frac{47}{64}$	8.10	$15\frac{3}{4}$	$10\frac{1}{4}$	1.7031
$1\frac{23}{32}$	8.10	$15\frac{3}{4}$	$10\frac{1}{4}$	1.7187
$1\frac{49}{64}$	8.40	16	$10\frac{1}{2}$	1.7343
$1\frac{3}{4}$	8.40	16	$10\frac{1}{2}$	1.75
$1\frac{51}{64}$	8.60	16	$10\frac{1}{2}$	1.7656
$1\frac{25}{32}$	8.60	16	$10\frac{1}{2}$	1.7812

\*Drills  $1\frac{33}{64}$  inches and larger take a different discount than  $1\frac{1}{2}$  inches and smaller  
 Drills  $1\frac{33}{64}$  to 2 inches have shanks  $1\frac{1}{2}$  inches diameter,  $4\frac{3}{4}$  inches long.

## No. 104.

## STRAIGHT SHANK TAPER LENGTH TWIST DRILLS

WITH INCREASE TWIST OR CONSTANT ANGLE.



Diameter, Inches.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.	Decimal Equivalent.
$1\frac{1}{4}$	\$8.80	$16\frac{1}{4}$	$10\frac{3}{4}$	1.7968
$1\frac{1}{8}$	8.80	$16\frac{1}{4}$	$10\frac{3}{4}$	1.8125
$1\frac{3}{8}$	9.00	$16\frac{1}{4}$	$10\frac{3}{4}$	1.8281
$1\frac{1}{2}$	9.00	$16\frac{1}{4}$	$10\frac{3}{4}$	1.8437
$1\frac{5}{8}$	9.20	$16\frac{1}{2}$	11	1.8593
$1\frac{7}{8}$	9.20	$16\frac{1}{2}$	11	1.875
$1\frac{7}{4}$	9.35	$16\frac{1}{2}$	11	1.8906
$1\frac{3}{2}$	9.35	$16\frac{1}{2}$	11	1.9062
$1\frac{5}{4}$	9.50	$16\frac{1}{2}$	11	1.9218
$1\frac{11}{8}$	9.50	$16\frac{1}{2}$	11	1.9375
$1\frac{3}{4}$	9.65	$16\frac{1}{2}$	11	1.9531
$1\frac{7}{8}$	9.65	$16\frac{1}{2}$	11	1.9687
$1\frac{1}{2}$	9.80	$16\frac{1}{2}$	11	1.9843
2	9.80	$16\frac{1}{2}$	11	2.
$2\frac{1}{4}$	10.20	$16\frac{1}{2}$	$9\frac{5}{8}$	2.0156
$2\frac{1}{2}$	10.20	$16\frac{1}{2}$	$9\frac{5}{8}$	2.0312
$2\frac{3}{4}$	10.60	17	$10\frac{1}{8}$	2.0468
$2\frac{1}{2}$	10.60	17	$10\frac{1}{8}$	2.0625
$2\frac{5}{8}$	10.90	17	$10\frac{1}{8}$	2.0781
$2\frac{3}{4}$	10.90	17	$10\frac{1}{8}$	2.0938
$2\frac{7}{8}$	11.20	17	$10\frac{1}{8}$	2.1093
$2\frac{1}{2}$	11.20	17	$10\frac{1}{8}$	2.125
$2\frac{9}{8}$	11.60	17	$10\frac{1}{8}$	2.1406
$2\frac{5}{4}$	11.60	17	$10\frac{1}{8}$	2.1562
$2\frac{11}{8}$	12.00	17	$10\frac{1}{8}$	2.1718
$2\frac{3}{2}$	12.00	17	$10\frac{1}{8}$	2.1875
$2\frac{1}{2}$	12.40	$17\frac{1}{2}$	$10\frac{5}{8}$	2.2031

Drills  $1\frac{1}{4}$  inches and larger take a different discount than  $1\frac{1}{2}$  inches and smaller.Drills  $1\frac{1}{4}$  to 2 inches have shanks  $1\frac{1}{4}$  inches in diameter,  $4\frac{3}{4}$  inches long.Drills  $2\frac{1}{4}$  to 3 inches have shanks  $1\frac{3}{4}$  inches diameter, 6 inches long.

## No. 104.

## STRAIGHT SHANK TAPER LENGTH TWIST DRILLS

WITH INCREASE TWIST OR CONSTANT ANGLE.



Diameter, Inches.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.	Decimal Equivalent.
$2\frac{7}{32}$	\$12.40	$17\frac{1}{2}$	$10\frac{5}{8}$	2.2187
$2\frac{15}{64}$	12.80	$17\frac{1}{2}$	$10\frac{5}{8}$	2.2343
$2\frac{1}{4}$	12.80	$17\frac{1}{2}$	$10\frac{1}{4}$	2.25
$2\frac{17}{64}$	13.20	$17\frac{1}{2}$	$10\frac{1}{4}$	2.2656
$2\frac{9}{32}$	13.20	$17\frac{1}{2}$	$10\frac{1}{4}$	2.2812
$2\frac{19}{64}$	13.60	$17\frac{1}{2}$	$10\frac{1}{4}$	2.2968
$2\frac{5}{16}$	13.60	$17\frac{1}{2}$	$10\frac{1}{4}$	2.3125
$2\frac{21}{64}$	14.00	18	$10\frac{3}{4}$	2.3281
$2\frac{11}{32}$	14.00	18	$10\frac{3}{4}$	2.3437
$2\frac{23}{64}$	14.40	18	$10\frac{3}{4}$	2.3593
$2\frac{3}{8}$	14.40	18	$10\frac{5}{8}$	2.375
$2\frac{25}{64}$	14.70	$18\frac{1}{2}$	$11\frac{1}{8}$	2.3906
$2\frac{13}{32}$	14.70	$18\frac{1}{2}$	$11\frac{1}{8}$	2.4062
$2\frac{27}{64}$	15.00	$18\frac{1}{2}$	$11\frac{1}{8}$	2.4218
$2\frac{7}{16}$	15.00	$18\frac{1}{2}$	$11\frac{1}{8}$	2.4375
$2\frac{29}{64}$	15.30	19	$11\frac{5}{8}$	2.4531
$2\frac{15}{32}$	15.30	19	$11\frac{5}{8}$	2.4687
$2\frac{31}{64}$	15.60	19	$11\frac{5}{8}$	2.4843
$2\frac{1}{2}$	15.60	19	$11\frac{1}{2}$	2.5
$2\frac{33}{64}$	15.90	$19\frac{1}{4}$	$11\frac{3}{4}$	2.5156
$2\frac{17}{32}$	15.90	$19\frac{1}{4}$	$11\frac{3}{4}$	2.5312
$2\frac{35}{64}$	16.20	$19\frac{1}{4}$	$11\frac{3}{4}$	2.5468
$2\frac{9}{16}$	16.20	$19\frac{1}{4}$	$11\frac{3}{4}$	2.5625
$2\frac{37}{64}$	16.50	$19\frac{1}{2}$	12	2.5781
$2\frac{19}{32}$	16.50	$19\frac{1}{2}$	12	2.5937
$2\frac{39}{64}$	16.80	$19\frac{1}{2}$	12	2.6093

Drills  $1\frac{13}{16}$  inches and larger take a different discount than  $1\frac{1}{2}$  inches and smaller.Drills  $2\frac{1}{4}$  to 3 inches have shanks  $1\frac{3}{4}$  inches diameter, 6 inches long.

## No. 104.

## STRAIGHT SHANK TAPER LENGTH TWIST DRILLS

WITH INCREASE TWIST OR CONSTANT ANGLE.



Diameter, Inches.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.	Decimal Equivalent.
2 5/8	\$16.80	19 1/2	11 7/8	2.625
2 1/4	17.20	20	12 3/8	2.6406
2 3/8	17.20	20	12 3/8	2.6562
2 1/2	17.60	20	12 3/8	2.6718
2 1/8	17.60	20	12 3/8	2.6875
2 1/4	18.30	20 1/2	12 7/8	2.7031
2 3/8	18.30	20 1/2	12 7/8	2.7187
2 1/2	19.00	20 1/2	12 7/8	2.7343
2 3/4	19.00	20 1/2	12 3/4	2.75
2 1/2	19.50	20 1/2	12 3/4	2.7656
2 3/8	19.50	20 1/2	12 3/4	2.7812
2 1/4	20.00	20 1/2	12 3/4	2.7968
2 1/8	20.00	20 1/2	12 3/4	2.8125
2 1/4	20.50	21	13 1/4	2.8281
2 3/8	20.50	21	13 1/4	2.8437
2 3/4	21.00	21	13 1/4	2.8593
2 7/8	21.00	21	13 1/8	2.875
2 1/2	22.00	21	13 3/8	2.8906
2 3/8	22.00	21	13 3/8	2.9062
2 1/4	23.00	21	13 3/8	2.9218
2 1/8	23.00	21	13 3/8	2.9375
2 1/4	24.00	22	14 1/8	2.9531
2 3/8	24.00	22	14 1/8	2.9687
2 1/2	25.00	22	14 1/8	2.9843
3	25.00	22	14	3.

Drills 2 1/4 to 3 inches have shanks 1 3/4 inches diameter, 6 inches long.

For sizes larger than 2 inches we do not recommend Two-Groove Drills. We would call special attention to our Three and Four-Groove Drills listed on pages 94, 111 which we think will enable customers to obtain much more satisfactory results.

For Nos. 104 A, 104 B, 104 D, 104 E, see pages 130-137; 104C, 115.

**No. 104 F.**  
**STRAIGHT SHANK TAPER LENGTH TWIST DRILLS**  
 WITH INCREASE TWIST OR CONSTANT ANGLE  
 MILLIMETER SIZES.



Diameter, M. M.	Price Each.	Diameter in Decimals of 1 Inch.	Whole Length, M. M.	Twist Cut, M. M.
1	\$ .35	.0394	57	25
1½	.35	.0591	76	32
2	.40	.0787	95	35
2½	.40	.0984	108	41
3	.45	.1181	130	63
3½	.45	.1378	133	70
4	.45	.1575	137	76
4½	.50	.1771	140	83
5	.55	.1968	149	95
5½	.55	.2165	152	102
6	.60	.2362	156	102
6½	.65	.2559	156	102
7	.65	.2756	159	102
7½	.70	.2953	162	103
8	.75	.3149	162	103
8½	.75	.3346	165	105
9	.80	.3543	172	108
9½	.80	.3740	172	108
10	.85	.3937	178	111
10½	.90	.4134	184	117
11	.90	.4330	184	117
11½	.95	.4527	191	124
12	1.00	.4724	191	124
12½	1.00	.4921	197	127
13	1.10	.5118	203	133
13½	1.20	.5315	203	133
14	1.20	.5512	210	137
14½	1.30	.5708	216	143
15	1.30	.5905	216	143
15½	1.40	.6102	222	146



**No. 104 F.****STRAIGHT SHANK TAPER LENGTH TWIST DRILLS**

WITH INCREASE TWIST OR CONSTANT ANGLE.

MILLIMETER SIZES.



Diameter, M. M.	Price Each.	Diameter in Decimals of 1 Inch.	Whole Length, M. M.	Twist Cut, M. M.
16	\$1.50	.6299	222	146
16½	1.50	.6496	229	149
17	1.60	.6693	235	152
17½	1.70	.6890	235	152
18	1.70	.7086	241	157
18½	1.85	.7283	247	162
19	1.85	.7480	247	162
19½	2.00	.7677	251	165
20	2.15	.7874	254	168
20½	2.15	.8071	254	168
21	2.30	.8267	260	171
21½	2.45	.8464	260	171
22	2.45	.8661	267	178
22½	2.60	.8858	270	178
23	2.60	.9055	270	178
23½	2.75	.9252	273	178
24	2.90	.9449	276	181
24½	2.90	.9646	276	181
25	3.00	.9842	279	183
25½	3.20	1.0039	279	183
26	3.20	1.0236	282	186
26½	3.40	1.0433	286	187
27	3.60	1.0629	286	187
27½	3.60	1.0827	292	194
28	3.80	1.1024	298	200
28½	3.80	1.1220	298	200
29	4.00	1.1417	302	203

**No. 104 F.****STRAIGHT SHANK TAPER LENGTH TWIST DRILLS**

WITH INCREASE TWIST OR CONSTANT ANGLE.

MILLIMETER SIZES.

Diameter, M. M.	Price Each.	Diameter in Decimals of 1 Inch.	Whole Length, M. M.	Twist Cut, M. M.
29½	\$4.20	1.1614	302	203
30	4.20	1.1811	305	206
30½	4.40	1.2008	308	206
31	4.50	1.2205	308	206
31½	4.50	1.2401	317	216
32	4.65	1.2598	317	216
32½	4.65	1.2795	359	232
33	4.80	1.2992	362	235
33½	5.00	1.3190	365	238
34	5.00	1.3386	365	238
34½	5.20	1.3583	368	241
35	5.20	1.3779	368	241
35½	5.40	1.3977	372	241
36	5.60	1.4173	375	244
36½	5.60	1.4370	375	244
37	5.80	1.4567	378	248
37½	6.00	1.4764	381	251
38	6.00	1.4961	381	251
*38½	6.30	1.5157	381	241
39	6.60	1.5354	381	241
39½	6.60	1.5551	387	248
40	6.90	1.5748	387	248
40½	6.90	1.5945	387	248
41	7.20	1.6142	394	254
41½	7.50	1.6338	394	254
42	7.50	1.6536	394	254
42½	7.80	1.6733	400	260
43	8.10	1.6929	400	260
43½	8.10	1.7126	400	260
44	8.40	1.7323	406	267
44½	8.40	1.7519	406	267

\*Drills 38½ M. M. and larger take a different discount than 38 M. M. and smaller.  
 Drills 38½ to 50½ M. M. diameter have shanks 38 M. M. diameter, 120 M. M. long.

**No. 104 F.****STRAIGHT SHANK TAPER LENGTH TWIST DRILLS**

WITH INCREASE TWIST OR CONSTANT ANGLE.

MILLIMETER SIZES.

Diameter, M. M.	Price Each.	Diameter in Decimals of 1 Inch.	Whole Length, M. M.	Twist Cut, M. M.
45	\$8.60	1.7717	406	267
45½	8.80	1.7914	413	273
46	8.80	1.8110	413	273
46½	9.00	1.8307	413	273
47	9.20	1.8504	419	279
47½	9.20	1.8701	419	279
48	9.35	1.8898	419	279
48½	9.35	1.9094	419	279
49	9.50	1.9291	419	279
49½	9.65	1.9488	419	279
50	9.65	1.9685	419	279
50½	9.80	1.9882	419	279
51	10.20	2.0079	419	244
51½	10.20	2.0276	419	244
52	10.60	2.0473	432	257
52½	10.60	2.0670	432	257
53	10.90	2.0866	432	257
53½	11.20	2.1063	432	257
54	11.20	2.1259	432	257
54½	11.60	2.1456	432	257
55	12.00	2.1654	432	257
55½	12.00	2.1851	432	257
56	12.40	2.2047	445	270
56½	12.80	2.2244	445	270
57	12.80	2.2441	445	260
57½	13.20	2.2637	445	260
58	13.60	2.2835	445	260
58½	13.60	2.3031	445	260
59	14.00	2.3228	457	273
59½	14.40	2.3425	457	273
60	14.40	2.3622	457	273

Drills 38½ M. M. and larger take a different discount than 38 M. M. and smaller.  
 Drills 38½ to 50½ M. M. diameter have shanks 38 M. M. diameter, 120 M. M. long.  
 Drills 51 to 76 M. M. diameter have shanks 45 M. M. diameter, 152 M. M. long.

**No. 104 F.****STRAIGHT SHANK TAPER LENGTH TWIST DRILLS**

WITH INCREASE TWIST OR CONSTANT ANGLE.

MILLIMETER SIZES.

Diameter, M. M.	Price Each.	Diameter in Decimals of 1 Inch.	Whole Length, M. M.	Twist Cut, M. M.
60½	14.70	2.3819	470	283
61	14.70	2.4015	470	283
61½	15.00	2.4212	470	283
62	15.30	2.4409	470	283
62½	15.30	2.4606	483	295
63	15.60	2.4803	483	295
63½	15.60	2.5	483	292
64	15.90	2.5197	489	298
64½	15.90	2.5393	489	298
65	16.20	2.5591	489	298
65½	16.50	2.5787	495	305
66	16.80	2.5984	495	305
66½	16.80	2.6181	495	302
67	17.20	2.6378	508	314
67½	17.20	2.6574	508	314
68	17.60	2.6772	508	314
68½	18.30	2.6969	521	327
69	18.30	2.7165	521	327
69½	19.00	2.7362	521	327
70	19.00	2.7559	521	324
70½	19.50	2.7756	521	324
71	20.00	2.7952	521	324
71½	20.00	2.8149	521	324
72	20.50	2.8347	533	337
72½	21.00	2.8543	533	337
73	21.00	2.8740	533	333
73½	22.00	2.8937	533	333
74	23.00	2.9134	533	333
74½	23.00	2.9330	533	333
75	24.00	2.9527	559	359
75½	25.00	2.9724	559	359
76	25.00	2.9921	559	356

Drills 38¼ M. M. and larger take a different discount than 38 M. M. and smaller.  
 Drills 51 to 76 M. M. diameter have shanks 45 M. M. diameter, 152 M. M. long.  
 For No. 104 G. see page 99, 104 H, 108, 104 K, 138, 104 L, 141.

# No. 104 M.

## DRILLS WITH GROOVED SHANKS.

TAPER SHANK LENGTHS.



Diameter, Inches.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.	Decimal Equivalent.
$\frac{3}{32}$	\$ .40	$4\frac{1}{4}$	$1\frac{5}{8}$	.0937
$\frac{7}{64}$	.45	$4\frac{5}{8}$	$2\frac{1}{4}$	.1093
$\frac{1}{8}$	.45	$5\frac{1}{8}$	$2\frac{1}{2}$	.125
$\frac{9}{64}$	.45	$5\frac{1}{4}$	$2\frac{3}{4}$	.1406
$\frac{5}{32}$	.45	$5\frac{3}{8}$	3	.1562
$\frac{11}{64}$	.50	$5\frac{1}{2}$	$3\frac{1}{4}$	.1718
$\frac{3}{16}$	.50	$5\frac{3}{4}$	$3\frac{1}{2}$	.1875
$\frac{13}{64}$	.55	$5\frac{7}{8}$	$3\frac{3}{4}$	.2031
$\frac{7}{32}$	.55	6	4	.2187
$\frac{15}{64}$	.60	$6\frac{1}{8}$	4	.2343
$\frac{1}{4}$	.60	$6\frac{1}{8}$	$3\frac{5}{8}$	.25
$\frac{17}{64}$	.65	$6\frac{1}{4}$	$3\frac{3}{4}$	.2656
$\frac{9}{32}$	.65	$6\frac{1}{4}$	$3\frac{3}{4}$	.2812
$\frac{19}{64}$	.70	$6\frac{3}{8}$	$3\frac{7}{8}$	.2968
$\frac{5}{16}$	.70	$6\frac{3}{8}$	$3\frac{7}{8}$	.3125
$\frac{21}{64}$	.75	$6\frac{1}{2}$	4	.3281
$\frac{11}{32}$	.75	$6\frac{1}{2}$	4	.3437
$\frac{23}{64}$	.80	$6\frac{3}{4}$	$4\frac{1}{8}$	.3593
$\frac{3}{8}$	.80	$6\frac{3}{4}$	$4\frac{1}{8}$	.375
$\frac{25}{64}$	.85	7	$4\frac{3}{8}$	.3906
$\frac{13}{32}$	.85	7	$4\frac{3}{8}$	.4062
$\frac{27}{64}$	.90	$7\frac{1}{4}$	$4\frac{5}{8}$	.4218
$\frac{7}{16}$	.90	$7\frac{1}{4}$	$4\frac{5}{8}$	.4375
$\frac{29}{64}$	.95	$7\frac{1}{2}$	$4\frac{3}{4}$	.4531
$\frac{15}{32}$	.95	$7\frac{1}{2}$	$4\frac{3}{4}$	.4687
$\frac{31}{64}$	1.00	$7\frac{3}{4}$	$4\frac{5}{8}$	.4843
$\frac{1}{2}$	1.00	$7\frac{3}{4}$	$4\frac{5}{8}$	.5
$\frac{33}{64}$	1.10	8	$4\frac{7}{8}$	.5156
$\frac{17}{32}$	1.10	8	$4\frac{7}{8}$	.5312

**No. 104 M.**  
**DRILLS WITH GROOVED SHANKS.**  
**TAPER SHANK LENGTHS.**



Diameter, Inches.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.	Decimal Equivalent.
$\frac{35}{64}$	\$1.20	$8\frac{1}{4}$	$5\frac{1}{8}$	.5468
$\frac{9}{16}$	1.20	$8\frac{1}{4}$	$5\frac{1}{8}$	.5625
$\frac{31}{64}$	1.30	$8\frac{1}{2}$	$5\frac{5}{16}$	.5781
$\frac{13}{32}$	1.30	$8\frac{1}{2}$	$5\frac{5}{16}$	.5937
$\frac{29}{64}$	1.40	$8\frac{3}{4}$	$5\frac{9}{16}$	.6093
$\frac{5}{8}$	1.40	$8\frac{3}{4}$	$5\frac{9}{16}$	.625
$\frac{41}{64}$	1.50	9	$5\frac{13}{16}$	.6406
$\frac{21}{32}$	1.50	9	$5\frac{13}{16}$	.6562
$\frac{43}{64}$	1.60	$9\frac{1}{4}$	6	.6718
$\frac{11}{16}$	1.60	$9\frac{1}{4}$	6	.6875
$\frac{45}{64}$	1.70	$9\frac{1}{2}$	$6\frac{1}{4}$	.7031
$\frac{33}{64}$	1.70	$9\frac{1}{2}$	$6\frac{1}{4}$	.7187
$\frac{47}{64}$	1.85	$9\frac{3}{4}$	$6\frac{1}{2}$	.7343
$\frac{3}{4}$	1.85	$9\frac{3}{4}$	$6\frac{1}{2}$	.75
$\frac{49}{64}$	2.00	$9\frac{7}{8}$	$5\frac{3}{4}$	.7656
$\frac{25}{32}$	2.00	$9\frac{7}{8}$	$5\frac{3}{4}$	.7812
$\frac{51}{64}$	2.15	10	$5\frac{7}{8}$	.7968
$\frac{13}{16}$	2.15	10	$5\frac{7}{8}$	.8125
$\frac{53}{64}$	2.30	$10\frac{1}{4}$	$6\frac{1}{8}$	.8281
$\frac{27}{32}$	2.30	$10\frac{1}{4}$	$6\frac{1}{8}$	.8437
$\frac{55}{64}$	2.45	$10\frac{1}{2}$	$6\frac{3}{8}$	.8593
$\frac{7}{8}$	2.45	$10\frac{1}{2}$	$6\frac{3}{8}$	.875
$\frac{57}{64}$	2.60	$10\frac{5}{8}$	$6\frac{3}{8}$	.8906
$\frac{35}{32}$	2.60	$10\frac{5}{8}$	$6\frac{3}{8}$	.9062
$\frac{59}{64}$	2.75	$10\frac{3}{4}$	$6\frac{1}{2}$	.9218
$\frac{15}{16}$	2.75	$10\frac{3}{4}$	$6\frac{1}{2}$	.9375
$\frac{61}{64}$	2.90	$10\frac{7}{8}$	$6\frac{5}{8}$	.9531
$\frac{37}{32}$	2.90	$10\frac{7}{8}$	$6\frac{5}{8}$	.9687
$\frac{63}{64}$	3.00	11	$6\frac{3}{4}$	.9843
1	3.00	11	$6\frac{3}{4}$	1.

**No. 104 M.**  
**DRILLS WITH GROOVED SHANKS.**  
**TAPER SHANK LENGTHS.**



Diameter, Inches.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.	Decimal Equivalent.
$1\frac{1}{8}$	\$3.20	$11\frac{1}{8}$	$6\frac{7}{8}$	1.0156
$1\frac{3}{8}$	3.20	$11\frac{1}{8}$	$6\frac{7}{8}$	1.0312
$1\frac{1}{4}$	3.40	$11\frac{1}{4}$	7	1.0468
$1\frac{1}{8}$	3.40	$11\frac{1}{4}$	7	1.0625
$1\frac{5}{8}$	3.60	$11\frac{1}{2}$	$7\frac{1}{8}$	1.0781
$1\frac{3}{4}$	3.60	$11\frac{1}{2}$	$7\frac{1}{8}$	1.0937
$1\frac{7}{8}$	3.80	$11\frac{3}{4}$	$7\frac{3}{8}$	1.1093
$1\frac{1}{8}$	3.80	$11\frac{3}{4}$	$7\frac{3}{8}$	1.125
$1\frac{5}{4}$	4.00	$11\frac{7}{8}$	$7\frac{1}{2}$	1.1406
$1\frac{5}{8}$	4.00	$11\frac{7}{8}$	$7\frac{1}{2}$	1.1562
$1\frac{11}{8}$	4.20	12	$7\frac{5}{8}$	1.1718
$1\frac{3}{4}$	4.20	12	$7\frac{5}{8}$	1.1875
$1\frac{13}{8}$	4.40	$12\frac{1}{8}$	$7\frac{5}{8}$	1.2031
$1\frac{7}{4}$	4.40	$12\frac{1}{8}$	$7\frac{5}{8}$	1.2187
$1\frac{15}{8}$	4.50	$12\frac{1}{2}$	8	1.2343
$1\frac{1}{4}$	4.50	$12\frac{1}{2}$	8	1.25
$1\frac{17}{8}$	4.65	$13\frac{5}{8}$	$9\frac{1}{8}$	1.2656
$1\frac{3}{2}$	4.65	$13\frac{5}{8}$	$9\frac{1}{8}$	1.2812
$1\frac{19}{8}$	4.80	$13\frac{3}{4}$	$9\frac{1}{4}$	1.2968
$1\frac{1}{6}$	4.80	$13\frac{3}{4}$	$9\frac{1}{4}$	1.3125
$1\frac{21}{8}$	5.00	14	$9\frac{3}{8}$	1.3281
$1\frac{11}{4}$	5.00	14	$9\frac{3}{8}$	1.3437
$1\frac{23}{8}$	5.20	$14\frac{1}{8}$	$9\frac{1}{2}$	1.3593
$1\frac{3}{8}$	5.20	$14\frac{1}{8}$	$9\frac{1}{2}$	1.375
$1\frac{25}{8}$	5.40	$14\frac{1}{8}$	$9\frac{1}{2}$	1.3906
$1\frac{13}{4}$	5.40	$14\frac{1}{8}$	$9\frac{1}{2}$	1.4062
$1\frac{27}{8}$	5.60	$14\frac{1}{4}$	$9\frac{5}{8}$	1.4218
$1\frac{7}{6}$	5.60	$14\frac{1}{4}$	$9\frac{5}{8}$	1.4375
$1\frac{29}{8}$	5.80	$14\frac{1}{2}$	$9\frac{3}{4}$	1.4531
$1\frac{15}{4}$	5.80	$14\frac{1}{2}$	$9\frac{3}{4}$	1.4687
$1\frac{31}{8}$	6.00	$14\frac{5}{8}$	$9\frac{7}{8}$	1.4843
$1\frac{1}{2}$	6.00	$14\frac{5}{8}$	$9\frac{7}{8}$	1.5

**No. 104 M.**  
**DRILLS WITH GROOVED SHANKS.**  
**TAPER SHANK LENGTHS.**



Diameter, Inches.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.	Decimal Equivalent.
*1 $\frac{33}{64}$	\$6.30	14 $\frac{1}{4}$	9 $\frac{1}{2}$	1.5156
1 $\frac{7}{16}$	6.30	14 $\frac{1}{4}$	9 $\frac{1}{2}$	1.5312
1 $\frac{13}{32}$	6.60	14 $\frac{1}{2}$	9 $\frac{3}{4}$	1.5468
1 $\frac{9}{16}$	6.60	14 $\frac{1}{2}$	9 $\frac{3}{4}$	1.5625
1 $\frac{27}{64}$	6.90	14 $\frac{1}{2}$	9 $\frac{3}{4}$	1.5781
1 $\frac{11}{16}$	6.90	14 $\frac{1}{2}$	9 $\frac{3}{4}$	1.5937
1 $\frac{23}{32}$	7.20	14 $\frac{3}{4}$	10	1.6093
1 $\frac{5}{8}$	7.20	14 $\frac{3}{4}$	10	1.625
1 $\frac{11}{16}$	7.50	14 $\frac{3}{4}$	10	1.6406
1 $\frac{23}{32}$	7.50	14 $\frac{3}{4}$	10	1.6562
1 $\frac{11}{16}$	7.80	15	10 $\frac{1}{4}$	1.6718
1 $\frac{11}{16}$	7.80	15	10 $\frac{1}{4}$	1.6875
1 $\frac{45}{64}$	8.10	15	10 $\frac{1}{4}$	1.7031
1 $\frac{23}{32}$	8.10	15	10 $\frac{1}{4}$	1.7187
1 $\frac{47}{64}$	8.40	15 $\frac{1}{4}$	10 $\frac{1}{2}$	1.7343
1 $\frac{3}{4}$	8.40	15 $\frac{1}{4}$	10 $\frac{1}{2}$	1.75
1 $\frac{49}{64}$	8.60	15 $\frac{1}{4}$	10 $\frac{1}{2}$	1.7656
1 $\frac{25}{32}$	8.60	15 $\frac{1}{4}$	10 $\frac{1}{2}$	1.7812
1 $\frac{51}{64}$	8.80	15 $\frac{1}{2}$	10 $\frac{3}{4}$	1.7968
1 $\frac{13}{16}$	8.80	15 $\frac{1}{2}$	10 $\frac{3}{4}$	1.8125
1 $\frac{27}{32}$	9.00	15 $\frac{1}{2}$	10 $\frac{3}{4}$	1.8281
1 $\frac{27}{32}$	9.00	15 $\frac{1}{2}$	10 $\frac{3}{4}$	1.8437
1 $\frac{55}{64}$	9.20	15 $\frac{3}{4}$	11	1.8593
1 $\frac{7}{8}$	9.20	15 $\frac{3}{4}$	11	1.875
1 $\frac{57}{64}$	9.35	15 $\frac{3}{4}$	11	1.8906
1 $\frac{29}{32}$	9.35	15 $\frac{3}{4}$	11	1.9062
1 $\frac{59}{64}$	9.50	15 $\frac{3}{4}$	11	1.9218
1 $\frac{15}{16}$	9.50	16 $\frac{1}{8}$	11	1.9375
1 $\frac{61}{64}$	9.65	16 $\frac{1}{8}$	11	1.9531
1 $\frac{31}{32}$	9.65	16 $\frac{1}{8}$	11	1.9687
1 $\frac{63}{64}$	9.80	16 $\frac{1}{8}$	11	1.9843
2	9.80	16 $\frac{1}{8}$	11	2.

\*Drills 1  $\frac{33}{64}$  inches and larger take a different discount than 1  $\frac{1}{4}$  inches and smaller.



**No 104 M.**  
**DRILLS WITH GROOVED SHANKS.**  
**TAPER SHANK LENGTHS.**



Diameter, Inches.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.	Decimal Equivalent.
$2\frac{1}{64}$	\$10.20	$14\frac{7}{8}$	$9\frac{5}{8}$	2.0156
$2\frac{1}{32}$	10.20	$14\frac{7}{8}$	$9\frac{5}{8}$	2.0312
$2\frac{3}{64}$	10.60	$15\frac{3}{8}$	$10\frac{1}{8}$	2.0468
$2\frac{1}{16}$	10.60	$15\frac{1}{2}$	$10\frac{1}{8}$	2.0625
$2\frac{5}{64}$	10.90	$15\frac{1}{2}$	$10\frac{1}{8}$	2.0781
$2\frac{3}{32}$	10.90	$15\frac{1}{2}$	$10\frac{1}{8}$	2.0938
$2\frac{7}{64}$	11.20	$15\frac{1}{2}$	$10\frac{1}{8}$	2.1093
$2\frac{1}{8}$	11.20	$15\frac{1}{2}$	$10\frac{1}{8}$	2.125
$2\frac{9}{64}$	11.60	$15\frac{1}{2}$	$10\frac{1}{8}$	2.1406
$2\frac{5}{32}$	11.60	$15\frac{1}{2}$	$10\frac{1}{8}$	2.1562
$2\frac{11}{64}$	12.00	$15\frac{1}{2}$	$10\frac{1}{8}$	2.1718
$2\frac{3}{16}$	12.00	$15\frac{5}{8}$	$10\frac{1}{8}$	2.1875
$2\frac{13}{64}$	12.40	$16\frac{1}{8}$	$10\frac{5}{8}$	2.2031
$2\frac{7}{32}$	12.40	$16\frac{1}{8}$	$10\frac{5}{8}$	2.2187
$2\frac{15}{64}$	12.80	$16\frac{1}{8}$	$10\frac{5}{8}$	2.2343
$2\frac{1}{4}$	12.80	$15\frac{3}{4}$	$10\frac{1}{4}$	2.25
$2\frac{17}{64}$	13.20	$15\frac{3}{4}$	$10\frac{1}{4}$	2.2656
$2\frac{9}{32}$	13.20	$15\frac{3}{4}$	$10\frac{1}{4}$	2.2812
$2\frac{19}{64}$	13.60	$15\frac{3}{4}$	$10\frac{1}{4}$	2.2968
$2\frac{5}{16}$	13.60	$15\frac{7}{8}$	$10\frac{1}{4}$	2.3125
$2\frac{21}{64}$	14.00	$16\frac{3}{8}$	$10\frac{3}{4}$	2.3281
$2\frac{11}{32}$	14.00	$16\frac{3}{8}$	$10\frac{3}{4}$	2.3437
$2\frac{23}{64}$	14.40	$16\frac{3}{8}$	$10\frac{3}{4}$	2.3593
$2\frac{3}{8}$	14.40	$16\frac{1}{4}$	$10\frac{5}{8}$	2.375
$2\frac{25}{64}$	14.70	$16\frac{3}{4}$	$11\frac{1}{8}$	2.3906
$2\frac{13}{32}$	14.70	$16\frac{3}{4}$	$11\frac{1}{8}$	2.4062
$2\frac{27}{64}$	15.00	$16\frac{3}{4}$	$11\frac{1}{8}$	2.4218
$2\frac{7}{16}$	15.00	$16\frac{7}{8}$	$11\frac{1}{8}$	2.4375
$2\frac{29}{64}$	15.30	$17\frac{3}{8}$	$11\frac{5}{8}$	2.4531
$2\frac{15}{32}$	15.30	$17\frac{3}{8}$	$11\frac{5}{8}$	2.4687
$2\frac{31}{64}$	15.60	$17\frac{3}{8}$	$11\frac{5}{8}$	2.4843
$2\frac{1}{2}$	15.60	$17\frac{1}{4}$	$11\frac{1}{2}$	2.5

Drills  $1\frac{11}{16}$  inches and larger take a different discount than  $1\frac{1}{2}$  inches and smaller.

**No. 104 M.**  
**DRILLS WITH GROOVED SHANKS.**  
**TAPER SHANK LENGTHS.**



Diameter, Inches.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.	Decimal Equivalent.
$2\frac{3}{4}$	\$15.90	$17\frac{1}{2}$	$11\frac{3}{4}$	2.5156
$2\frac{1}{2}$	15.90	$17\frac{1}{2}$	$11\frac{3}{4}$	2.5312
$2\frac{1}{4}$	16.20	$17\frac{1}{2}$	$11\frac{3}{4}$	2.5468
$2\frac{1}{8}$	16.20	$17\frac{5}{8}$	$11\frac{3}{4}$	2.5625
$2\frac{1}{16}$	16.50	$17\frac{7}{8}$	12	2.5781
$2\frac{3}{32}$	16.50	$17\frac{7}{8}$	12	2.5937
$2\frac{1}{4}$	16.80	$17\frac{7}{8}$	12	2.6093
$2\frac{5}{16}$	16.80	$17\frac{3}{4}$	$11\frac{7}{8}$	2.625
$2\frac{3}{8}$	17.20	$18\frac{1}{4}$	$12\frac{3}{8}$	2.6406
$2\frac{1}{2}$	17.20	$18\frac{1}{4}$	$12\frac{3}{8}$	2.6562
$2\frac{1}{4}$	17.60	$18\frac{1}{4}$	$12\frac{3}{8}$	2.6718
$2\frac{1}{8}$	17.60	$18\frac{3}{8}$	$12\frac{3}{8}$	2.6875
$2\frac{1}{16}$	18.30	$18\frac{7}{8}$	$12\frac{7}{8}$	2.7031
$2\frac{3}{32}$	18.30	$18\frac{7}{8}$	$12\frac{7}{8}$	2.7187
$2\frac{1}{4}$	19.00	$18\frac{7}{8}$	$12\frac{7}{8}$	2.7343
$2\frac{3}{8}$	19.00	$18\frac{3}{4}$	$12\frac{3}{4}$	2.75
$2\frac{1}{2}$	19.50	$18\frac{3}{4}$	$12\frac{3}{4}$	2.7656
$2\frac{3}{16}$	19.50	$18\frac{3}{4}$	$12\frac{3}{4}$	2.7812
$2\frac{1}{8}$	20.00	$18\frac{3}{4}$	$12\frac{3}{4}$	2.7968
$2\frac{1}{16}$	20.00	$18\frac{7}{8}$	$12\frac{3}{4}$	2.8125
$2\frac{5}{32}$	20.50	$19\frac{3}{8}$	$13\frac{1}{4}$	2.8281
$2\frac{1}{4}$	20.50	$19\frac{3}{8}$	$13\frac{1}{4}$	2.8437
$2\frac{1}{8}$	21.00	$19\frac{3}{8}$	$13\frac{1}{4}$	2.8593
$2\frac{7}{16}$	21.00	$19\frac{1}{4}$	$13\frac{1}{8}$	2.875
$2\frac{1}{2}$	22.00	$19\frac{1}{4}$	$13\frac{1}{8}$	2.8906
$2\frac{3}{8}$	22.00	$19\frac{1}{4}$	$13\frac{1}{8}$	2.9062
$2\frac{5}{16}$	23.00	$19\frac{1}{4}$	$13\frac{1}{8}$	2.9218
$2\frac{1}{8}$	23.00	$19\frac{3}{8}$	$13\frac{1}{8}$	2.9375
$2\frac{1}{16}$	24.00	$20\frac{3}{8}$	$14\frac{1}{8}$	2.9531
$2\frac{3}{32}$	24.00	$20\frac{3}{8}$	$14\frac{1}{8}$	2.9687
$2\frac{1}{4}$	25.00	$20\frac{3}{8}$	$14\frac{1}{8}$	2.9843
3	25.00	$20\frac{1}{4}$	14	3.

For sizes larger than 2 inches we do not recommend Two-Groove Drills. We would call special attention to our Three and Four-Groove Drills listed on pages 94-111 which we think will enable customers to obtain much more satisfactory results.

**No. 104 N.**  
**REAMER DRILLS.**

STRAIGHT SHANK TAPER LENGTH.



Diameter, Inches.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.	To Precede Reamer, Size.
.245	\$ .60	6 $\frac{1}{8}$	4	$\frac{1}{4}$
.276	.65	6 $\frac{1}{4}$	4	$\frac{3}{8}$
.306	.70	6 $\frac{3}{8}$	4 $\frac{1}{8}$	$\frac{5}{16}$
.337	.75	6 $\frac{1}{2}$	4 $\frac{1}{8}$	$\frac{11}{32}$
.369	.80	6 $\frac{3}{4}$	4 $\frac{1}{4}$	$\frac{3}{8}$
.400	.85	7	4 $\frac{3}{8}$	$\frac{13}{32}$
.429	.90	7 $\frac{1}{4}$	4 $\frac{5}{8}$	$\frac{7}{16}$
.462	.95	7 $\frac{1}{2}$	4 $\frac{7}{8}$	$\frac{15}{32}$
.492	1.00	7 $\frac{3}{4}$	5	$\frac{1}{2}$
.554	1.20	8 $\frac{1}{4}$	5 $\frac{3}{8}$	$\frac{9}{16}$
.615	1.40	8 $\frac{3}{4}$	5 $\frac{3}{4}$	$\frac{5}{8}$
.677	1.60	9 $\frac{1}{4}$	6	$\frac{11}{16}$
.740	1.85	9 $\frac{3}{4}$	6 $\frac{3}{8}$	$\frac{3}{4}$
.802	2.15	10	6 $\frac{5}{8}$	$\frac{13}{16}$
.865	2.45	10 $\frac{1}{2}$	7	$\frac{7}{8}$
.927	2.75	10 $\frac{3}{4}$	7	$\frac{15}{16}$
.990	3.00	11	7 $\frac{3}{16}$	1

For Reamer Drills larger than one inch we recommend the use of Three or Four-Groove Drills listed on pages 94-111.

**No. 105.**  
**STRAIGHT SHANK DRILLS**  
 WITH INCREASE TWIST OR CONSTANT ANGLE.



**JOBBER'S' LENGTHS.**

Diameter, Inches.	Price Per Dozen.	Price Each.	Whole Length, Inches	Twist Cut, Inches.	Decimal Equivalent
$\frac{1}{32}$	\$ .90	\$.09	$1\frac{7}{8}$	$\frac{9}{16}$	.0312
$\frac{3}{64}$	1.00	.09	$1\frac{1}{4}$	$\frac{3}{8}$	.0468
$\frac{1}{16}$	1.00	.09	$2\frac{1}{2}$	$1\frac{1}{4}$	.0625
$\frac{5}{64}$	1.10	.10	$2\frac{5}{8}$	$1\frac{3}{8}$	.0781
$\frac{3}{32}$	1.20	.11	$2\frac{3}{4}$	$1\frac{1}{2}$	.0937
$\frac{7}{64}$	1.30	.12	$2\frac{7}{8}$	$1\frac{1}{8}$	.1093
$\frac{1}{8}$	1.45	.13	3	$1\frac{1}{8}$	.125
$\frac{9}{64}$	1.60	.15	$3\frac{1}{8}$	$1\frac{1}{8}$	.1406
$\frac{5}{32}$	1.80	.16	$3\frac{1}{4}$	$2\frac{3}{32}$	.1562
$\frac{11}{64}$	2.00	.18	$3\frac{3}{8}$	$2\frac{7}{32}$	.1718
$\frac{3}{16}$	2.20	.20	$3\frac{1}{2}$	$2\frac{5}{16}$	.1875
$\frac{13}{64}$	2.40	.21	$3\frac{5}{8}$	$2\frac{7}{16}$	.2031
$\frac{7}{32}$	2.65	.23	$3\frac{3}{4}$	$2\frac{1}{2}$	.2187
$\frac{15}{64}$	2.90	.26	$3\frac{7}{8}$	$2\frac{1}{4}$	.2343
$\frac{1}{4}$	3.15	.28	4	$2\frac{3}{4}$	.25
$\frac{17}{64}$	3.40	.30	$4\frac{1}{8}$	$2\frac{7}{8}$	.2656
$\frac{9}{32}$	3.65	.32	$4\frac{1}{4}$	$2\frac{3}{2}$	.2812
$\frac{19}{64}$	3.90	.35	$4\frac{3}{8}$	$3\frac{3}{32}$	.2968
$\frac{5}{16}$	4.20	.37	$4\frac{1}{2}$	$3\frac{3}{16}$	.3125
$\frac{21}{64}$	4.50	.40	$4\frac{5}{8}$	$3\frac{5}{16}$	.3281
$\frac{11}{32}$	4.80	.42	$4\frac{3}{4}$	$3\frac{1}{2}$	.3437
$\frac{23}{64}$	5.10	.45	$4\frac{7}{8}$	$3\frac{1}{2}$	.3593
$\frac{3}{8}$	5.40	.48	5	$3\frac{5}{8}$	.375
$\frac{25}{64}$	5.70	.50	$5\frac{1}{8}$	$3\frac{3}{4}$	.3906
$\frac{13}{32}$	6.00	.53	$5\frac{1}{4}$	$3\frac{1}{2}$	.4062
$\frac{27}{64}$	6.40	.55	$5\frac{3}{8}$	$3\frac{1}{2}$	.4218
$\frac{7}{16}$	6.80	.59	$5\frac{1}{2}$	$4\frac{1}{16}$	.4375
$\frac{29}{64}$	7.20	.63	$5\frac{5}{8}$	$4\frac{3}{16}$	.4531
$\frac{15}{32}$	7.50	.65	$5\frac{3}{4}$	$4\frac{9}{32}$	.4687
$\frac{31}{64}$	7.75	.67	$5\frac{7}{8}$	$4\frac{1}{2}$	.4843
$\frac{1}{2}$	8.00	.70	6	$4\frac{1}{2}$	.5

For prices of Sets of these Drills see pages 147, 150, 151.

**No. 105A.**  
**STRAIGHT SHANK DRILLS**  
 WITH INCREASE TWIST OR CONSTANT ANGLE.



**WIRE AND JOBBERS' LENGTHS**  
**MILLIMETER SIZES.**

Diameter, M. M.	Price Per Dozen.	Price Each.	Diameter in Decimals of 1 Inch.	Approximate Whole Length, M. M.	Approximate Length Twist Cut, M. M.
.5	\$ .90	\$.08	.0197	25	6.5
.55	.90	.08	.0216	27	6.5
.6	.90	.08	.0236	30	9.5
.65	.90	.08	.0256	31	11.
.7	.90	.08	.0276	34	14.5
.75	.90	.08	.0296	35	14.5
.8	.90	.08	.0315	37	14.5
.85	.90	.08	.0335	37	14.5
.9	.90	.08	.0354	38	16.
.95	.90	.08	.0374	38	16.
1.	.90	.08	.0394	39	17.5
1.05	.95	.09	.0413	39	17.5
1.1	.95	.09	.0433	43	20.
1.15	.95	.09	.0453	43	20.
1.2	.95	.09	.0472	44	20.5
1.25	.95	.09	.0492	44	20.5
1.3	.95	.09	.0512	44	20.5
1.35	.95	.09	.0532	45	21.5
1.4	.95	.09	.0551	46	21.5
1.45	.95	.09	.0571	46	21.5
1.5	.95	.09	.0591	46	21.5
1.55	1.10	.10	.0610	48	22.
1.6	1.10	.10	.0630	48	22.
1.65	1.10	.10	.0650	49	24.
1.7	1.10	.10	.0669	49	24.
1.75	1.10	.10	.0689	49	24.
1.8	1.10	.10	.0709	51	25.5
1.85	1.10	.10	.0728	51	25.5
1.9	1.10	.10	.0748	52	27.
1.95	1.10	.10	.0768	53	28.
2.	1.10	.10	.0787	53	28.

For prices of Sets of these Drills see pages 147 and 151.

**No. 105A.**  
**STRAIGHT SHANK DRILLS**  
**WITH INCREASE TWIST OR CONSTANT ANGLE**



**WIRE AND JOBBERS' LENGTHS.**  
**MILLIMETER SIZES.**

Diameter, M. M.	Price Per Dozen.	Price Each.	Diameter in Decimals of 1 Inch.	Approximate Whole Length, M. M.	Approximate Length Twist Cut, M. M.
2.05	\$1.25	\$ .12	.0807	54	28.5
2.1	1.25	.12	.0827	56	30.
2.15	1.25	.12	.0846	56	30.
2.2	1.25	.12	.0866	57	31.
2.25	1.25	.12	.0886	57	31.
2.3	1.25	.12	.0905	58	31.5
2.35	1.25	.12	.0925	58	31.5
2.4	1.25	.12	.0945	59	33.5
2.45	1.25	.12	.0965	59	33.5
2.5	1.25	.12	.0984	60	34.
2.6	1.40	.14	.1024	63	36.5
2.7	1.40	.14	.1063	65	38.
2.8	1.40	.14	.1102	67	39.5
2.9	1.40	.14	.1142	69	41.5
3.	1.40	.14	.1181	70	43.
3.1	1.55	.15	.1220	70	43.
3.2	1.55	.15	.1260	71	43.5
3.3	1.55	.15	.1299	71	43.5
3.4	1.55	.15	.1339	72	44.5
3.5	1.55	.15	.1378	73	46.
3.6	1.75	.17	.1417	73	46.
3.7	1.75	.17	.1457	74	47.
3.8	1.75	.17	.1496	76	48.5
3.9	1.75	.17	.1535	78	50.
4.	1.75	.17	.1575	79	51.
4.1	1.95	.19	.1614	81	52.5
4.2	1.95	.19	.1653	83	53.
4.3	1.95	.19	.1693	84	54.
4.4	1.95	.19	.1732	85	55.
4.5	1.95	.19	.1772	86	55.5
4.6	2.25	.21	.1811	88	57.

**No. 105A.**  
**STRAIGHT SHANK DRILLS**  
 WITH INCREASE TWIST OR CONSTANT ANGLE.



**MILLIMETER SIZES.**

Diameter, M. M.	Price Per Dozen.	Price Each.	Diameter in Decimals of 1 Inch.	Approximate Whole Length, M. M.	Approximate Length Twist Cut, M. M.
4.7	\$2.25	\$.21	.1850	89	58.
4.8	2.25	.21	.1890	90	58.5
4.9	2.25	.21	.1929	92	60.5
5.	2.25	.21	.1968	93	62.
5.1	2.35	.22	.2008	95	63.5
5.2	2.35	.22	.2047	96	64.5
5.3	2.35	.22	.2087	98	66.
5.4	2.35	.22	.2126	99	66.5
5.5	2.35	.22	.2165	100	66.5
5.6	2.90	.26	.2205	100	66.5
5.7	2.90	.26	.2244	100	66.5
5.8	2.90	.26	.2283	102	67.5
5.9	2.90	.26	.2323	102	67.5
6.	2.90	.26	.2362	102	67.5
6.1	3.15	.28	.2402	102	67.5
6.2	3.15	.28	.2441	102	67.5
6.3	3.15	.28	.2480	102	67.5
6.4	3.15	.28	.2520	102	67.5
6.5	3.15	.28	.2559	105	73.
6.6	3.65	.32	.2598	105	73.
6.7	3.65	.32	.2638	105	73.
6.8	3.65	.32	.2677	108	76.
6.9	3.65	.32	.2716	108	76.
7.	3.65	.32	.2756	108	76.
7.1	3.90	.35	.2795	108	76.
7.2	3.90	.35	.2835	108	76.
7.3	3.90	.35	.2874	108	76.
7.4	3.90	.35	.2913	108	76.
7.5	3.90	.35	.2953	111	78.5
7.6	4.20	.37	.2992	111	78.5
7.7	4.20	.37	.3031	111	78.5

**No. 105A.**  
**STRAIGHT SHANK DRILLS**  
 WITH INCREASE TWIST OR CONSTANT ANGLE.



**WIRE AND JOBBERS' LENGTHS.**  
 MILLIMETER SIZES.

Diameter, M. M.	Price Per Dozen.	Price Each.	Diameter in Decimals of 1 Inch.	Approximate Whole Length, M. M.	Approximate Length Twist Cut, M. M.
7.8	\$4.20	\$.37	.3071	111	78.5
7.9	4.20	.37	.3110	111	78.5
8.	4.20	.37	.3150	114	81.
8.1	4.80	.42	.3189	114	81.
8.2	4.80	.42	.3228	117	84.
8.3	4.80	.42	.3268	117	84.
8.4	4.80	.42	.3307	117	84.
8.5	4.80	.42	.3346	117	84.
8.6	5.10	.45	.3386	121	87.5
8.7	5.10	.45	.3425	121	87.5
8.8	5.10	.45	.3465	121	87.5
8.9	5.10	.45	.3504	121	87.5
9.	5.10	.45	.3543	124	89.5
9.1	5.40	.48	.3583	124	89.5
9.2	5.40	.48	.3622	124	89.5
9.3	5.40	.48	.3661	124	89.5
9.4	5.40	.48	.3701	124	89.5
9.5	5.40	.48	.3740	127	93.
9.6	5.70	.50	.3779	127	93.
9.7	5.70	.50	.3819	127	93.
9.8	5.70	.50	.3858	130	95.
9.9	5.70	.50	.3898	130	95.
10.	5.70	.50	.3937	130	95.
10.5	6.00	.53	.4134	133	97.5
11.	6.80	.59	.4331	140	104.
11.5	7.20	.63	.4528	143	106.5
12.	7.50	.65	.4724	146	108.5
12.5	8.00	.70	.4921	162	111.
13.	10.00	.85	.5118	167	114.5



## No. 105 B.

## DRILLS WITH GROOVED SHANKS.



## JOBBER'S' LENGTHS

Diameter, Inches.	Price Per Dozen.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.	Decimal Equivalent.
$\frac{3}{32}$	\$1.20	\$ .11	$2\frac{3}{4}$	$1\frac{9}{16}$	.0937
$\frac{7}{64}$	1.30	.12	$2\frac{7}{8}$	$1\frac{11}{16}$	.1093
$\frac{1}{8}$	1.45	.13	3	$1\frac{3}{4}$	.125
$\frac{9}{64}$	1.60	.15	$3\frac{1}{8}$	$1\frac{7}{8}$	.1406
$\frac{5}{32}$	1.80	.16	$3\frac{1}{4}$	2	.1562
$\frac{11}{64}$	2.00	.18	$3\frac{3}{8}$	$2\frac{1}{8}$	.1718
$\frac{3}{16}$	2.20	.20	$3\frac{1}{2}$	$2\frac{3}{16}$	.1875
$\frac{13}{64}$	2.40	.21	$3\frac{5}{8}$	$2\frac{5}{16}$	.2031
$\frac{7}{32}$	2.65	.23	$3\frac{3}{4}$	$2\frac{3}{8}$	.2187
$\frac{15}{64}$	2.90	.26	$3\frac{7}{8}$	$2\frac{1}{2}$	.2343
$\frac{1}{4}$	3.15	.28	4	$1\frac{1}{2}$	.25
$\frac{17}{64}$	3.40	.30	$4\frac{1}{8}$	$2\frac{1}{8}$	.2656
$\frac{9}{32}$	3.65	.32	$4\frac{1}{4}$	$2\frac{3}{16}$	.2812
$\frac{19}{64}$	3.90	.35	$4\frac{3}{8}$	$2\frac{1}{4}$	.2968
$\frac{5}{16}$	4.20	.37	$4\frac{1}{2}$	$2\frac{3}{8}$	.3125
$\frac{21}{64}$	4.50	.40	$4\frac{5}{8}$	$2\frac{1}{2}$	.3281
$\frac{11}{32}$	4.80	.42	$4\frac{3}{4}$	$2\frac{9}{16}$	.3437
$\frac{23}{64}$	5.10	.45	$4\frac{7}{8}$	$2\frac{11}{16}$	.3593
$\frac{3}{8}$	5.40	.48	5	$2\frac{1}{2}$	.375
$\frac{25}{64}$	5.70	.50	$5\frac{1}{8}$	$2\frac{7}{8}$	.3906
$\frac{13}{32}$	6.00	.53	$5\frac{1}{4}$	3	.4062
$\frac{27}{64}$	6.40	.55	$5\frac{3}{8}$	$3\frac{1}{8}$	.4218
$\frac{7}{16}$	6.80	.59	$5\frac{1}{2}$	$3\frac{1}{4}$	.4375
$\frac{29}{64}$	7.20	.63	$5\frac{5}{8}$	$3\frac{1}{4}$	.4531
$\frac{15}{32}$	7.50	.65	$5\frac{3}{4}$	$3\frac{3}{8}$	.4687
$\frac{31}{64}$	7.75	.67	$5\frac{7}{8}$	$3\frac{1}{2}$	.4843
$\frac{1}{2}$	8.00	.70	6	$3\frac{5}{8}$	.5

Letter size drills with Grooved Shanks furnished at same list and discount as No. 106 Drills, page 56.

## No. 106.

## STRAIGHT SHANK DRILLS

WITH INCREASE TWIST OR CONSTANT ANGLE.



## LETTER SIZES.

Size by Gauge.	Price Per Dozen.	Price Each.	Decimal Equivalent.	Whole Length, Inches.	Twist Cut, Inches.
A	\$2.90	\$.26	.234	3 $\frac{1}{8}$	2 $\frac{1}{8}$
B	3.00	.27	.238	3 $\frac{1}{8}$	2 $\frac{1}{8}$
C	3.10	.28	.242	3 $\frac{1}{8}$	2 $\frac{1}{8}$
D	3.20	.29	.246	3 $\frac{1}{8}$	2 $\frac{1}{8}$
E	3.30	.30	.250	3 $\frac{1}{8}$	2 $\frac{1}{8}$
F	3.40	.30	.257	4 $\frac{1}{4}$	3
G	3.50	.31	.261	4 $\frac{1}{4}$	3
H	3.60	.32	.266	4 $\frac{1}{4}$	3
I	3.70	.33	.272	4 $\frac{1}{4}$	3
J	3.80	.34	.277	4 $\frac{1}{4}$	3
K	3.90	.35	.281	4 $\frac{1}{4}$	3
L	4.00	.36	.290	4 $\frac{1}{4}$	2 $\frac{3}{8}$
M	4.10	.36	.295	4 $\frac{1}{4}$	2 $\frac{3}{8}$
N	4.20	.37	.302	4 $\frac{1}{4}$	2 $\frac{3}{8}$
O	4.30	.38	.316	4 $\frac{1}{4}$	2 $\frac{1}{2}$
P	4.40	.39	.323	4 $\frac{1}{2}$	3 $\frac{1}{8}$
Q	4.60	.40	.332	4 $\frac{5}{8}$	3 $\frac{1}{8}$
R	4.80	.42	.339	4 $\frac{5}{8}$	3 $\frac{1}{8}$
S	5.00	.44	.348	4 $\frac{3}{4}$	3 $\frac{1}{2}$
T	5.20	.45	.358	4 $\frac{3}{4}$	3 $\frac{1}{2}$
U	5.40	.47	.368	4 $\frac{7}{8}$	3 $\frac{1}{2}$
V	5.60	.49	.377	5	3 $\frac{5}{8}$
W	5.80	.51	.386	5	3 $\frac{5}{8}$
X	6.00	.53	.397	5 $\frac{1}{8}$	3 $\frac{3}{4}$
Y	6.40	.55	.404	5 $\frac{1}{8}$	3 $\frac{3}{4}$
Z	6.80	.59	.413	5 $\frac{1}{4}$	3 $\frac{3}{4}$

For prices of a Set of these Drills see page 147.

## No. 107.

## STRAIGHT SHANK WIRE DRILLS.



Number by Gauge.	Price Per Dozen.	Price Each.	Decimals of 1 Inch.	Approximate Length, Inches.	Twist Cut, Inches.
1	\$2.35	\$ .22	.2280	4	2 $\frac{1}{2}$
2	2.35	.22	.2210	3 $\frac{1}{8}$	2 $\frac{5}{8}$
3	2.35	.22	.2130	3 $\frac{1}{8}$	2 $\frac{5}{8}$
4	2.35	.22	.2090	3 $\frac{7}{8}$	2 $\frac{1}{2}$
5	2.35	.22	.2055	3 $\frac{1}{8}$	2 $\frac{1}{8}$
6	2.25	.21	.2040	3 $\frac{1}{8}$	2 $\frac{1}{2}$
7	2.25	.21	.2010	3 $\frac{3}{4}$	2 $\frac{1}{2}$
8	2.25	.21	.1990	3 $\frac{1}{8}$	2 $\frac{1}{2}$
9	2.25	.21	.1960	3 $\frac{1}{8}$	2 $\frac{1}{8}$
10	2.25	.21	.1935	3 $\frac{5}{8}$	2 $\frac{3}{8}$
11	2.10	.20	.1910	3 $\frac{1}{8}$	2 $\frac{1}{2}$
12	2.10	.20	.1890	3 $\frac{1}{8}$	2 $\frac{1}{8}$
13	2.10	.20	.1850	3 $\frac{1}{2}$	2 $\frac{3}{2}$
14	2.10	.20	.1820	3 $\frac{7}{8}$	2 $\frac{1}{4}$
15	2.10	.20	.1800	3 $\frac{7}{8}$	2 $\frac{3}{2}$
16	1.95	.19	.1770	3 $\frac{3}{8}$	2 $\frac{1}{8}$
17	1.95	.19	.1730	3 $\frac{1}{8}$	2 $\frac{1}{2}$
18	1.95	.19	.1695	3 $\frac{1}{8}$	2 $\frac{1}{8}$
19	1.95	.19	.1660	3 $\frac{1}{4}$	2 $\frac{3}{2}$
20	1.95	.19	.1610	3 $\frac{3}{8}$	2 $\frac{1}{8}$
21	1.75	.17	.1590	3 $\frac{3}{8}$	2 $\frac{1}{8}$
22	1.75	.17	.1570	3 $\frac{1}{8}$	2
23	1.75	.17	.1540	3 $\frac{1}{8}$	1 $\frac{3}{2}$
24	1.75	.17	.1520	3 $\frac{1}{8}$	1 $\frac{1}{8}$
25	1.75	.17	.1495	3	1 $\frac{3}{2}$
26	1.55	.15	.1470	2 $\frac{1}{8}$	1 $\frac{7}{8}$
27	1.55	.15	.1440	2 $\frac{1}{8}$	1 $\frac{3}{2}$

For prices of Sets of these Drills see pages 147, 150, 151.

## No. 107.

## STRAIGHT SHANK WIRE DRILLS.



Number by Gauge.	Price Per Dozen.	Price Each.	Decimals of 1 Inch.	Approximate Length, Inches.	Twist Cut, Inches.
28	\$1.55	\$ .15	.1405	2 $\frac{7}{8}$	1 $\frac{1}{8}$
29	1.55	.15	.1360	2 $\frac{1}{8}$	1 $\frac{3}{4}$
30	1.55	.15	.1285	2 $\frac{1}{8}$	1 $\frac{3}{8}$
31	1.40	.14	.1200	2 $\frac{3}{4}$	1 $\frac{1}{8}$
32	1.40	.14	.1160	2 $\frac{1}{8}$	1 $\frac{5}{8}$
33	1.40	.14	.1130	2 $\frac{1}{8}$	1 $\frac{5}{8}$
34	1.40	.14	.1110	2 $\frac{5}{8}$	1 $\frac{9}{16}$
35	1.40	.14	.1100	2 $\frac{9}{16}$	1 $\frac{1}{2}$
36	1.25	.12	.1065	2 $\frac{9}{16}$	1 $\frac{1}{2}$
37	1.25	.12	.1040	2 $\frac{1}{2}$	1 $\frac{7}{16}$
38	1.25	.12	.1015	2 $\frac{7}{16}$	1 $\frac{3}{8}$
39	1.25	.12	.0995	2 $\frac{7}{16}$	1 $\frac{1}{2}$
40	1.25	.12	.0980	2 $\frac{3}{8}$	1 $\frac{1}{2}$
41	1.10	.10	.0960	2 $\frac{9}{16}$	1 $\frac{9}{16}$
42	1.10	.10	.0935	2 $\frac{9}{16}$	1 $\frac{1}{4}$
43	1.10	.10	.0890	2 $\frac{1}{4}$	1 $\frac{7}{32}$
44	1.10	.10	.0860	2 $\frac{3}{16}$	1 $\frac{3}{16}$
45	1.10	.10	.0820	2 $\frac{3}{16}$	1 $\frac{1}{8}$
46	.95	.09	.0810	2 $\frac{1}{8}$	1 $\frac{1}{8}$
47	.95	.09	.0785	2 $\frac{1}{16}$	1 $\frac{3}{32}$
48	.95	.09	.0760	2 $\frac{1}{16}$	1 $\frac{1}{16}$
49	.95	.09	.0730	2	1
50	.95	.09	.0700	1 $\frac{1}{8}$	$\frac{3}{16}$
51	.95	.09	.0670	1 $\frac{1}{8}$	$\frac{1}{8}$
52	.95	.09	.0635	1 $\frac{7}{8}$	$\frac{7}{8}$
53	.95	.09	.0595	1 $\frac{1}{8}$	$\frac{3}{16}$
54	.95	.09	.0550	1 $\frac{1}{8}$	$\frac{3}{16}$

## No. 107.

## STRAIGHT SHANK WIRE DRILLS.



Number by Gauge.	Price Per Dozen.	Price Each.	Decimals of 1 Inch.	Approximate Length, Inches.	Twist Cut, Inches.
55	\$ .95	\$ .09	.0520	1 $\frac{3}{4}$	1 $\frac{1}{8}$
56	.95	.09	.0465	1 $\frac{1}{8}$	2 $\frac{3}{8}$
57	.95	.09	.0430	1 $\frac{1}{8}$	2 $\frac{3}{8}$
58	.95	.09	.0420	1 $\frac{5}{8}$	2 $\frac{3}{8}$
59	.95	.09	.0410	1 $\frac{9}{16}$	1 $\frac{1}{8}$
60	.95	.09	.0400	1 $\frac{9}{16}$	1 $\frac{1}{8}$
61	.90	.08	.0390	1 $\frac{1}{2}$	5 $\frac{5}{8}$
62	.90	.08	.0380	1 $\frac{1}{2}$	5 $\frac{5}{8}$
63	.90	.08	.0370	1 $\frac{1}{2}$	5 $\frac{5}{8}$
64	.90	.08	.0360	1 $\frac{1}{2}$	5 $\frac{5}{8}$
65	.90	.08	.0350	1 $\frac{1}{2}$	5 $\frac{5}{8}$
66	.90	.08	.0330	1 $\frac{1}{2}$	2 $\frac{9}{16}$
67	.90	.08	.0320	1 $\frac{7}{16}$	2 $\frac{9}{16}$
68	.90	.08	.0310	1 $\frac{7}{16}$	2 $\frac{9}{16}$
69	.90	.08	.0292	1 $\frac{3}{8}$	2 $\frac{9}{16}$
70	.90	.08	.0280	1 $\frac{5}{16}$	2 $\frac{9}{16}$
71	1.00	.09	.0260	1 $\frac{5}{16}$	1 $\frac{1}{2}$
72	1.00	.09	.0250	1 $\frac{1}{4}$	7 $\frac{7}{16}$
73	1.00	.09	.0240	1 $\frac{3}{16}$	3 $\frac{3}{8}$
74	1.00	.09	.0225	1 $\frac{1}{8}$	5 $\frac{5}{16}$
75	1.00	.09	.0210	1 $\frac{1}{8}$	1 $\frac{1}{4}$
76	1.00	.09	.0200	1	1 $\frac{1}{4}$
77	1.00	.09	.0180	1 $\frac{1}{8}$	7 $\frac{7}{32}$
78	1.00	.09	.0160	7 $\frac{7}{8}$	7 $\frac{7}{32}$
79	1.00	.09	.0145	1 $\frac{1}{8}$	3 $\frac{3}{16}$
80	1.00	.09	.0135	3 $\frac{3}{4}$	3 $\frac{3}{16}$

# **No. 107 B.** **STRAIGHT SHANK JEWELERS' DRILLS.**



## **WIRE GAUGE SIZES.**

Number by Gauge.	Price Per Dozen.	Price Each.	Decimals of 1 Inch.	Whole Length, Inches.	Twist Cut, Inches.
30	\$1.55	\$ .15	.1285	$1\frac{3}{32}$	$1\frac{5}{16}$
31	1.40	.14	.1200	$1\frac{3}{32}$	$1\frac{5}{16}$
32	1.40	.14	.1160	$1\frac{3}{32}$	$1\frac{5}{16}$
33	1.40	.14	.1130	$1\frac{3}{32}$	$1\frac{5}{16}$
34	1.40	.14	.1110	$1\frac{3}{32}$	$1\frac{5}{16}$
35	1.40	.14	.1100	$1\frac{3}{32}$	$1\frac{5}{16}$
36	1.25	.12	.1065	$1\frac{3}{32}$	$1\frac{5}{16}$
37	1.25	.12	.1040	$1\frac{3}{32}$	$1\frac{5}{16}$
38	1.25	.12	.1015	$1\frac{3}{32}$	$1\frac{5}{16}$
39	1.25	.12	.0995	$1\frac{3}{32}$	$1\frac{5}{16}$
40	1.25	.12	.0980	$1\frac{3}{32}$	$1\frac{5}{16}$
41	1.10	.10	.0960	$1\frac{3}{32}$	$1\frac{5}{16}$
42	1.10	.10	.0935	$1\frac{3}{32}$	$1\frac{1}{4}$
43	1.10	.10	.0890	$1\frac{3}{32}$	$1\frac{7}{32}$
44	1.10	.10	.0860	$1\frac{3}{32}$	$1\frac{3}{8}$
45	1.10	.10	.0820	$1\frac{3}{32}$	$1\frac{1}{8}$
46	.95	.09	.0810	$1\frac{3}{32}$	$1\frac{1}{8}$
47	.95	.09	.0785	$1\frac{3}{32}$	$1\frac{3}{32}$
48	.95	.09	.0760	$1\frac{3}{32}$	$1\frac{1}{8}$
49	.95	.09	.0730	$1\frac{3}{32}$	1
50	.95	.09	.0700	$1\frac{1}{8}$	$\frac{3}{16}$
51	.95	.09	.0670	$1\frac{1}{8}$	$\frac{1}{8}$
52	.95	.09	.0635	$1\frac{7}{8}$	$\frac{7}{8}$
53	.95	.09	.0595	$1\frac{1}{8}$	$\frac{3}{16}$
54	.95	.09	.0550	$1\frac{1}{8}$	$\frac{3}{16}$
55	.95	.09	.0520	$1\frac{3}{4}$	$\frac{1}{8}$
56	.95	.09	.0465	$1\frac{1}{8}$	$\frac{3}{16}$
57	.95	.09	.0430	$1\frac{1}{8}$	$\frac{3}{16}$
58	.95	.09	.0420	$1\frac{5}{8}$	$\frac{3}{16}$
59	.95	.09	.0410	$1\frac{1}{8}$	$\frac{1}{8}$
60	.95	.09	.0400	$1\frac{1}{8}$	$\frac{1}{8}$

For prices of Sets of Jewellers' Drills see page 146

**No. 107 B.**  
**STRAIGHT SHANK JEWELERS' DRILLS.**



**WIRE GAUGE SIZES.**

Number by Gauge.	Price Per Dozen.	Price Each.	Decimals of 1 Inch.	Whole Length, Inches.	Twist Cut, Inches.
61	\$ .90	\$.08	.039	1½	5/8
62	.90	.08	.038	1½	5/8
63	.90	.08	.037	1½	5/8
64	.90	.08	.036	1½	5/8
65	.90	.08	.035	1½	5/8
66	.90	.08	.033	1½	11/16
67	.90	.08	.032	1 7/16	11/16
68	.90	.08	.031	1 7/16	11/16
69	.90	.08	.029	1 3/8	9/16
70	.90	.08	.028	1 7/16	11/16
71	1.00	.09	.026	1 5/16	1/2
72	1.00	.09	.025	1 1/4	7/16
73	1.00	.09	.024	1 3/16	3/8
74	1.00	.09	.0225	1 1/8	5/16
75	1.00	.09	.021	1 1/16	1/4
76	1.00	.09	.02	1	1/4
77	1.00	.09	.018	11/16	7/32
78	1.00	.09	.016	7/8	7/32
79	1.00	.09	.0145	11/16	3/16
80	1.00	.09	.0135	3/4	3/16

For prices of Sets of Jewellers' Drills see page 146.

**No. 107 C.**  
**STRAIGHT SHANK JEWELERS' DRILLS.**

**FRACTIONAL SIZES.**

Diameter, Inches.	Price Per Dozen.	Price Each.	Decimals of 1 Inch.	Whole Length, Inches.	Twist Cut, Inches.
1/32	\$ .90	\$.08	.0312	1 7/16	9/16
3/64	.95	.09	.0468	1 11/16	21/32
1/16	1.00	.09	.0625	1 7/8	7/8
5/64	1.10	.10	.0781	2	1 1/4
3/32	1.20	.11	.0937	2	1 1/4
7/64	1.30	.12	.1093	2	1 1/4
1/8	1.45	.13	.1250	2	1 1/4

## LEFT HAND DRILLS.

### LEFT HAND MORSE TAPER SHANK DRILLS.



List prices same as Right Hand Drills on pages 14-21.

### LEFT HAND STRAIGHT SHANK TAPER LENGTH DRILLS.



List prices same as Right Hand Drills on pages 31-37.

### LEFT HAND TAPER SQUARE SHANK DRILLS.



Small Shank or No. 1. Size of Shank  $\frac{3}{8}$  inch x  $\frac{5}{8}$  inch x  $1\frac{1}{2}$  inches.  
This size Shank always furnished unless otherwise specified.

Large Shank or No. 2. Size of Shank,  $\frac{1}{2}$  inch x  $\frac{3}{4}$  inch x  $1\frac{3}{4}$  inches  
List prices same as Right Hand Drills on pages 73-74.

### LEFT HAND STRAIGHT SHANK DRILLS, JOBBERS' LENGTH.



List prices same as Right Hand Drills on page 50.  
Carried in stock in sizes  $\frac{1}{16}$  inch to  $\frac{1}{2}$  inch by 64ths.

### LEFT HAND STRAIGHT SHANK WIRE DRILLS.



List prices same as Right Hand Drills on pages 57-59  
Carried in stock in sizes No. 1 to No. 65.

**Discounts quoted on application.**



## No. 108.

## STRAIGHT SHANK MACHINE BITS

FOR WOOD.



Diam., Inches.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.	Diam., Inches.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.
$\frac{1}{8}$	\$ .20	3	$1\frac{1}{8}$	$\frac{3}{32}$	\$1.50	$7\frac{1}{4}$	$5\frac{1}{2}$
$\frac{5}{32}$	.25	$3\frac{1}{4}$	$2\frac{3}{32}$	$\frac{3}{4}$	1.65	$7\frac{1}{2}$	$5\frac{1}{8}$
$\frac{3}{16}$	.30	$3\frac{1}{2}$	$2\frac{5}{16}$	$\frac{3}{8}$	1.80	$7\frac{3}{4}$	$5\frac{7}{8}$
$\frac{7}{32}$	.35	$3\frac{3}{4}$	$2\frac{1}{2}$	$\frac{1}{8}$	1.95	8	$6\frac{1}{8}$
$\frac{1}{4}$	.40	4	$2\frac{3}{4}$	$\frac{3}{16}$	2.15	$8\frac{1}{4}$	$6\frac{1}{4}$
$\frac{9}{32}$	.45	$4\frac{1}{4}$	$2\frac{3}{4}$	$\frac{7}{8}$	2.30	$8\frac{1}{2}$	$6\frac{1}{8}$
$\frac{5}{16}$	.50	$4\frac{1}{2}$	$3\frac{1}{8}$	$\frac{3}{8}$	2.50	$8\frac{3}{4}$	$6\frac{5}{8}$
$\frac{11}{32}$	.55	$4\frac{3}{4}$	$3\frac{1}{2}$	$\frac{1}{2}$	2.65	9	$6\frac{1}{2}$
$\frac{3}{8}$	.65	5	$3\frac{5}{8}$	$\frac{3}{4}$	2.85	$9\frac{1}{4}$	7
$\frac{13}{32}$	.70	$5\frac{1}{4}$	$3\frac{7}{8}$	1	3.00	$9\frac{1}{2}$	$7\frac{3}{8}$
$\frac{7}{16}$	.75	$5\frac{1}{2}$	$4\frac{1}{8}$	$1\frac{1}{16}$	3.60	$11\frac{1}{4}$	$8\frac{1}{2}$
$\frac{15}{32}$	.80	$5\frac{3}{4}$	$4\frac{3}{8}$	$1\frac{1}{8}$	4.00	$11\frac{3}{4}$	$8\frac{7}{8}$
$\frac{1}{2}$	.85	6	$4\frac{1}{2}$	$1\frac{1}{4}$	4.40	12	9
$\frac{17}{32}$	.95	$6\frac{1}{8}$	$4\frac{1}{2}$	$1\frac{1}{2}$	4.80	$12\frac{1}{2}$	$9\frac{3}{8}$
$\frac{9}{16}$	1.00	$6\frac{1}{4}$	$4\frac{1}{2}$	$1\frac{5}{16}$	5.20	$12\frac{1}{2}$	$9\frac{3}{8}$
$\frac{19}{32}$	1.10	$6\frac{3}{8}$	$4\frac{3}{4}$	$1\frac{3}{8}$	5.60	$12\frac{1}{2}$	$9\frac{3}{8}$
$\frac{5}{8}$	1.15	$6\frac{1}{2}$	$4\frac{7}{8}$	$1\frac{7}{16}$	6.00	$12\frac{1}{2}$	$9\frac{3}{8}$
$\frac{21}{32}$	1.25	$6\frac{3}{4}$	5	$1\frac{1}{2}$	6.40	$12\frac{1}{2}$	$9\frac{3}{8}$
$\frac{11}{16}$	1.35	7	$5\frac{5}{16}$				

For prices of Sets of Machine Bits see pages 148 and 150.

# No. 108 A.

## MACHINE BITS FOR WOOD.

TAPER LENGTHS.

FITTING THE PRENTICE BLACKSMITHS' DRILL PRESSES NOS. 1 AND 2.



SHANKS  $\frac{1}{2}$  INCH DIAMETER,  $2\frac{1}{2}$  INCHES LONG.

Diam., Inches.	Price, Each.	Whole Length, Inches.	Twist Cut, Inches.	Diam., Inches.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.
$\frac{1}{8}$	\$ .50	$4\frac{5}{8}$	$1\frac{1}{8}$	$\frac{3}{32}$	\$1.90	$9\frac{1}{2}$	$6\frac{1}{4}$
$\frac{5}{32}$	.50	$4\frac{7}{8}$	$2\frac{3}{32}$	$\frac{3}{4}$	2.00	$9\frac{3}{4}$	$6\frac{1}{2}$
$\frac{3}{16}$	.60	5	$2\frac{5}{16}$	$\frac{3}{8}$	2.20	$9\frac{7}{8}$	$6\frac{5}{8}$
$\frac{7}{32}$	.60	$5\frac{1}{4}$	$2\frac{1}{2}$	$\frac{1}{2}$	2.40	10	$6\frac{3}{4}$
$\frac{1}{4}$	.70	$6\frac{1}{8}$	3	$\frac{3}{4}$	2.50	$10\frac{1}{4}$	7
$\frac{9}{32}$	.75	$6\frac{1}{4}$	3	$\frac{7}{8}$	2.60	$10\frac{1}{2}$	$7\frac{1}{4}$
$\frac{5}{16}$	.80	$6\frac{3}{8}$	$3\frac{1}{8}$	$\frac{3}{8}$	2.80	$10\frac{5}{8}$	$7\frac{3}{8}$
$\frac{11}{32}$	.85	$6\frac{1}{2}$	$3\frac{1}{4}$	$\frac{1}{2}$	3.00	$10\frac{3}{4}$	$7\frac{1}{2}$
$\frac{3}{8}$	.90	$6\frac{3}{4}$	$3\frac{1}{2}$	$\frac{3}{4}$	3.20	$10\frac{7}{8}$	$7\frac{5}{8}$
$\frac{13}{32}$	.95	7	$3\frac{3}{4}$	1	3.40	11	$7\frac{3}{8}$
$\frac{7}{16}$	1.00	$7\frac{1}{4}$	4	$1\frac{1}{16}$	3.60	$11\frac{1}{4}$	$7\frac{5}{8}$
$\frac{15}{32}$	1.10	$7\frac{1}{2}$	$4\frac{1}{4}$	$1\frac{1}{8}$	4.00	$11\frac{3}{4}$	8
$\frac{1}{2}$	1.20	$7\frac{3}{4}$	$4\frac{1}{2}$	$1\frac{3}{16}$	4.40	12	$8\frac{1}{4}$
$\frac{17}{32}$	1.30	8	$4\frac{3}{4}$	$1\frac{1}{4}$	4.80	$12\frac{1}{2}$	$8\frac{5}{8}$
$\frac{9}{16}$	1.40	$8\frac{1}{4}$	5	$1\frac{5}{16}$	5.20	$12\frac{1}{2}$	$8\frac{5}{8}$
$\frac{19}{32}$	1.50	$8\frac{1}{2}$	$5\frac{1}{4}$	$1\frac{3}{8}$	5.60	$12\frac{1}{2}$	$8\frac{1}{2}$
$\frac{5}{8}$	1.60	$8\frac{3}{4}$	$5\frac{1}{2}$	$1\frac{7}{16}$	6.00	$12\frac{1}{2}$	$8\frac{1}{2}$
$\frac{21}{32}$	1.70	9	$5\frac{3}{4}$	$1\frac{1}{2}$	6.40	$12\frac{1}{2}$	$8\frac{3}{8}$
$\frac{11}{16}$	1.80	$9\frac{1}{4}$	6				

## No. 108 B.

## MACHINE BITS FOR WOOD

WITH MORSE TAPER SHANKS.



Diam., Inches.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.	Morse Taper Shank.	Diam., Inches.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.	Morse Taper Shank.
$\frac{1}{8}$	\$ .50	$4\frac{5}{8}$	$1\frac{1}{8}$	No 1.	$\frac{3}{32}$	\$1.90	$9\frac{1}{2}$	$5\frac{1}{8}$	No. 2.
$\frac{5}{32}$	.50	$4\frac{7}{8}$	$2\frac{3}{4}$		$\frac{3}{16}$	2.00	$9\frac{3}{4}$	$5\frac{1}{8}$	
$\frac{3}{16}$	.60	5	$2\frac{5}{8}$		$\frac{1}{4}$	2.20	$9\frac{7}{8}$	$6\frac{1}{8}$	
$\frac{7}{32}$	.60	$5\frac{1}{4}$	$2\frac{1}{2}$		$\frac{1}{8}$	2.40	10	$6\frac{3}{8}$	
$\frac{1}{4}$	.70	$6\frac{1}{8}$	3		$\frac{3}{16}$	2.50	$10\frac{1}{4}$	$6\frac{7}{8}$	
$\frac{9}{32}$	.75	$6\frac{1}{4}$	$2\frac{1}{2}$		$\frac{7}{8}$	2.60	$10\frac{1}{2}$	$6\frac{1}{8}$	
$\frac{5}{16}$	.80	$6\frac{3}{8}$	$3\frac{1}{8}$		$\frac{3}{8}$	2.80	$10\frac{5}{8}$	$6\frac{1}{8}$	
$\frac{11}{32}$	.85	$6\frac{1}{2}$	$3\frac{1}{8}$		$\frac{1}{2}$	3.00	$10\frac{3}{4}$	$6\frac{1}{4}$	
$\frac{3}{8}$	.90	$6\frac{3}{4}$	$3\frac{7}{8}$		$\frac{3}{4}$	3.20	$10\frac{7}{8}$	$6\frac{3}{8}$	
$\frac{13}{32}$	.95	7	$3\frac{1}{8}$		1	3.40	11	$6\frac{1}{2}$	No. 3.
$\frac{7}{16}$	1.00	$7\frac{1}{4}$	$3\frac{1}{8}$	No. 2	$1\frac{1}{8}$	3.60	$11\frac{1}{4}$	$6\frac{3}{4}$	
$\frac{15}{32}$	1.10	$7\frac{1}{2}$	$4\frac{3}{16}$		$1\frac{1}{8}$	4.00	$11\frac{3}{4}$	$7\frac{1}{4}$	
$\frac{1}{2}$	1.20	$7\frac{3}{4}$	$4\frac{7}{8}$		$1\frac{3}{16}$	4.40	12	$7\frac{1}{2}$	
$\frac{17}{32}$	1.30	8	$4\frac{1}{8}$		$1\frac{1}{4}$	4.80	$12\frac{1}{2}$	8	
$\frac{9}{16}$	1.40	$8\frac{1}{4}$	$4\frac{1}{8}$		$1\frac{5}{16}$	5.20	$14\frac{1}{4}$	$8\frac{3}{4}$	
$\frac{19}{32}$	1.50	$8\frac{1}{2}$	$4\frac{5}{8}$		$1\frac{3}{8}$	5.60	$14\frac{1}{2}$	9	No. 4.
$\frac{5}{8}$	1.60	$8\frac{3}{4}$	$4\frac{1}{2}$		$1\frac{7}{8}$	6.00	$14\frac{3}{4}$	$9\frac{1}{4}$	
$\frac{21}{32}$	1.70	9	$5\frac{1}{8}$		$1\frac{1}{2}$	6.40	15	$9\frac{1}{2}$	
$\frac{11}{16}$	1.80	$9\frac{1}{4}$	$5\frac{7}{8}$						

**SPECIAL MACHINE BITS FOR WOOD.**

When tools made as illustrated below are desired, designate them by number, giving whole length and length of twist or pod.

**No. 108 C.****No. 108 D.****No. 108 E.****No. 108 F.****No. 108 G.****No. 108 H.—POD BITS.****No. 108 J.—PAPER DRILLS.**

If taper shanks are desired give number of socket when ordering.

## SOLID AND ADJUSTABLE COUNTERBORES AND DRILLS FOR WOOD.

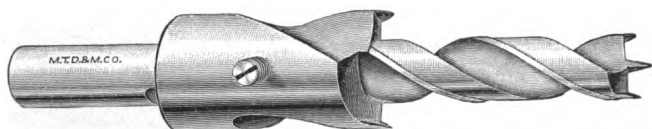
In ordering tools as below follow closely instructions given. If other than straight shank is required, give dimensions in detail.

### No. 108K.



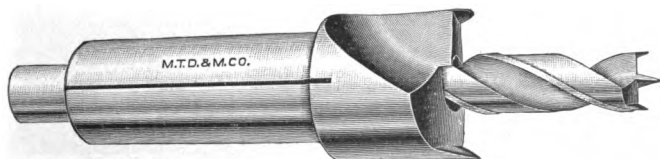
Give diameter and length of large and small parts.

### No. 108L.



Give diameter and length of drill as well as diameter and length of counterbore.

### No. 108 M.



Give diameter and length of drill as well as diameter and length of both body and cutting parts of counterbore.

### No. 108N.

#### ROUTING BITS

FOR CUTTING WOOD, SOFT METAL, ZINC, ETC.



In ordering state diameter, whole length, length of cut and style of shank required.

## SPECIAL MACHINE BITS FOR WOOD.

When tools made as illustrated below are desired, designate them by number, giving whole length and length of twist.

## SINGLE GROOVE DRILLS.

## No. 108 P.



## No. 108 R.



## No. 108 S.



If Taper Shanks are desired give number of socket when ordering.

## No. 108 T.

## SCREW SHANK MACHINE BITS

## FITTING PRYBIL MACHINES.



Diameter, Inches.	Price Each.	Whole Length, Inches.	Diameter, Inches.	Price Each.	Whole Length, Inches.
$\frac{3}{16}$	\$ .75	$3\frac{3}{4}$	$\frac{11}{32}$	\$1.00	4
$\frac{7}{32}$	.80	$3\frac{3}{4}$	$\frac{3}{8}$	1.10	4
$\frac{1}{4}$	.85	$3\frac{3}{4}$	$\frac{13}{32}$	1.20	4
$\frac{9}{32}$	.90	$3\frac{3}{4}$	$\frac{7}{16}$	1.30	4
$\frac{5}{16}$	.95	$3\frac{3}{4}$	$\frac{15}{32}$	1.40	4

When ordering these Bits always give diameter and length of Screw Shank, also pitch and form of thread.

Special sizes made to order.

## No. 109.

## BIT STOCK DRILLS

FOR METAL OR WOOD.



Diameter, Inches.	Price Per Dozen.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.	Length from Shank to Point, Inches
$\frac{1}{32}$	\$1.25	\$ .12	$2\frac{7}{8}$	$\frac{1}{16}$	$1\frac{1}{8}$
$\frac{3}{64}$	1.40	.13	$3\frac{3}{16}$	$\frac{3}{32}$	$1\frac{3}{8}$
$\frac{1}{16}$	1.50	.14	$3\frac{5}{16}$	$\frac{7}{8}$	$1\frac{1}{2}$
$\frac{5}{64}$	1.60	.15	$3\frac{7}{16}$	$1\frac{3}{32}$	$1\frac{3}{4}$
$\frac{3}{32}$	1.65	.16	$3\frac{5}{8}$	$1\frac{1}{4}$	$1\frac{3}{4}$
$\frac{7}{64}$	1.90	.18	$3\frac{7}{8}$	$1\frac{1}{2}$	$2\frac{3}{32}$
$\frac{1}{8}$	2.10	.20	$3\frac{5}{8}$	$1\frac{3}{4}$	$2\frac{3}{32}$
$\frac{9}{64}$	2.35	.22	$3\frac{11}{16}$	$1\frac{11}{16}$	$2\frac{1}{2}$
$\frac{5}{32}$	2.60	.24	$3\frac{13}{16}$	2	$2\frac{1}{2}$
$\frac{11}{64}$	2.85	.26	$4\frac{1}{8}$	$2\frac{5}{32}$	$2\frac{3}{4}$
$\frac{3}{16}$	3.10	.29	$4\frac{5}{16}$	$2\frac{5}{16}$	$2\frac{3}{4}$
$\frac{13}{64}$	3.35	.31	$4\frac{3}{8}$	$2\frac{7}{16}$	$3\frac{1}{32}$
$\frac{7}{32}$	3.60	.33	$4\frac{11}{16}$	$2\frac{5}{8}$	$3\frac{1}{32}$
$\frac{15}{64}$	3.85	.36	$5\frac{3}{16}$	$3\frac{3}{16}$	$3\frac{1}{16}$
$\frac{1}{4}$	4.10	.38	$5\frac{1}{8}$	$3\frac{1}{8}$	$3\frac{1}{8}$
$\frac{17}{64}$	4.40	.41	$5\frac{3}{8}$	$3\frac{3}{8}$	$4\frac{1}{8}$
$\frac{9}{32}$	4.70	.43	$5\frac{3}{8}$	$3\frac{3}{8}$	$4\frac{1}{8}$
$\frac{19}{64}$	5.05	.46	$5\frac{1}{2}$	$3\frac{1}{2}$	$4\frac{1}{4}$
$\frac{1}{2}$	5.40	.48	$5\frac{1}{2}$	$3\frac{1}{2}$	$4\frac{1}{4}$
$\frac{21}{64}$	5.85	.51	$5\frac{7}{8}$	$3\frac{7}{8}$	$4\frac{5}{8}$
$\frac{11}{32}$	6.30	.54	$5\frac{7}{8}$	$3\frac{7}{8}$	$4\frac{5}{8}$
$\frac{3}{8}$	7.20	.62	$5\frac{7}{8}$	$3\frac{7}{8}$	$4\frac{5}{8}$
$\frac{13}{32}$	8.00	.68	$5\frac{7}{8}$	$3\frac{5}{8}$	$4\frac{1}{8}$

Our Bit Stock Drills will fit any brace in the market, and will drill steel, iron, or other metals as well as wood. They are not injured by contact with screws or nails, and will bore straight any kind of wood without splitting it.

For prices of Sets of Bit Stock Drills see pages 148 and 150.

## No. 109.

## BIT STOCK DRILLS

FOR METAL OR WOOD.



Diameter, Inches.	Price Per Dozen.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.	Length from Shank to Point, Inches.
$\frac{1}{16}$	\$8.80	\$ .75	$6\frac{1}{4}$	4	$4\frac{1}{2}$
$\frac{1}{8}$	9.60	.82	$6\frac{5}{8}$	$4\frac{3}{8}$	$4\frac{7}{8}$
$\frac{1}{4}$	10.30	.87	$6\frac{3}{4}$	$4\frac{7}{16}$	5
$\frac{3}{8}$	11.00	.92	$7\frac{1}{2}$	$5\frac{3}{16}$	$5\frac{3}{4}$
$\frac{9}{16}$	14.35	1.20	$7\frac{1}{2}$	$5\frac{3}{16}$	$5\frac{3}{4}$
$\frac{1}{2}$	15.55	1.30	$7\frac{1}{2}$	$5\frac{1}{8}$	$5\frac{3}{4}$
$\frac{5}{8}$	16.15	1.35	$7\frac{1}{2}$	$5\frac{1}{8}$	$5\frac{3}{4}$
$\frac{3}{4}$	17.35	1.45	$7\frac{1}{2}$	$5\frac{1}{8}$	$5\frac{3}{4}$
$\frac{7}{8}$	17.95	1.50	$7\frac{1}{2}$	$5\frac{1}{8}$	$5\frac{3}{4}$
$\frac{1}{2}$	19.15	1.60	$7\frac{1}{2}$	$5\frac{1}{8}$	$5\frac{3}{4}$
$\frac{3}{4}$	19.75	1.65	$7\frac{1}{2}$	5	$5\frac{3}{4}$
$\frac{7}{8}$	20.95	1.75	$7\frac{1}{2}$	5	$5\frac{3}{4}$
$\frac{1}{2}$	21.55	1.80	$7\frac{1}{2}$	5	$5\frac{3}{4}$
$\frac{3}{4}$	22.75	1.90	$7\frac{1}{2}$	5	$5\frac{3}{4}$
$\frac{7}{8}$	23.35	1.95	$7\frac{1}{2}$	5	$5\frac{3}{4}$
$\frac{1}{2}$	24.55	2.05	$7\frac{1}{2}$	5	$5\frac{3}{4}$
$\frac{1}{2}$	25.75	2.15	$7\frac{1}{2}$	$4\frac{11}{16}$	$5\frac{3}{4}$
$\frac{3}{4}$	26.95	2.25	$7\frac{1}{2}$	$4\frac{11}{16}$	$5\frac{3}{4}$
1	28.15	2.35	$7\frac{1}{2}$	$4\frac{11}{16}$	$5\frac{3}{4}$
$1\frac{1}{16}$	35.95	3.00	$7\frac{1}{2}$	$4\frac{11}{16}$	$5\frac{3}{4}$
$1\frac{1}{8}$	40.15	3.35	$7\frac{1}{2}$	$4\frac{7}{8}$	$5\frac{3}{4}$
$1\frac{3}{16}$	43.15	3.60	$7\frac{1}{2}$	$4\frac{7}{8}$	$5\frac{3}{4}$
$1\frac{1}{4}$	44.95	3.75	$7\frac{1}{2}$	$4\frac{7}{8}$	$5\frac{3}{4}$

Our Bit Stock Drills will fit any brace in the market, and will drill steel, iron or other metals as well as wood. They are not injured by contact with screws or nails, and will bore straight any kind of wood without splitting it.

For prices of Sets of Bit Stock Drills see pages 148 and 150.



**No. 109½.****BIT STOCK DRILLS**

FOR METAL OR WOOD.

MILLIMETER SIZES.



Diameter, M. M.	Price Per Dozen.	Price Each.	Diameter in Decimals of 1 Inch.	Whole Length, M. M.	Twist Cut, M. M.
1	\$1.40	\$ .13	.0394	76	16
1½	1.50	.14	.0591	83	21
2	1.65	.16	.0787	87	28
2½	1.90	.18	.0984	95	34
3	2.10	.20	.1181	103	43
3½	2.35	.22	.1378	94	46
4	2.60	.24	.1575	100	51
4½	3.10	.29	.1772	106	56
5	3.35	.31	.1969	113	62
5½	3.60	.33	.2165	119	67
6	3.85	.36	.2362	132	81
6½	4.10	.38	.2559	132	81
7	4.70	.43	.2756	137	86
7½	5.05	.46	.2953	140	89
8	5.40	.48	.3150	140	89
8½	6.30	.54	.3446	149	98
9	6.75	.58	.3543	149	98
9½	7.20	.62	.3740	149	98
10	8.00	.68	.3937	149	92
10½	8.40	.72	.4134	159	102
11	8.80	.75	.4331	159	102
11½	9.60	.82	.4528	168	111
12	9.95	.85	.4724	168	111
12½	10.30	.87	.4921	171	113
13	11.00	.92	.5118	190	132

Our Bit Stock Drills will fit any brace in the market, and will drill steel, iron, or other metals as well as wood. They are not injured by contact with screws or nails, and will bore straight any kind of wood without splitting it.

**No. 109½.****BIT STOCK DRILLS**

FOR METAL OR WOOD.

MILLIMETER SIZES.



Diameter, M. M.	Price Per Dozen.	Price Each.	Diameter in Decimals of 1 Inch.	Whole Length, M. M.	Twist Cut, M. M.
13½	\$12.70	\$1.10	.5315	190	132
14	14.35	1.20	.5512	190	132
14½	14.95	1.25	.5709	190	132
15	15.55	1.30	.5905	190	132
15½	15.85	1.35	.6102	190	132
16	16.15	1.35	.6299	190	129
16½	17.35	1.45	.6496	190	129
17	17.95	1.50	.6693	190	129
17½	18.55	1.55	.6890	190	129
18	19.15	1.60	.7087	190	129
18½	19.45	1.65	.7283	190	129
19	19.75	1.65	.7480	190	127
19½	20.35	1.70	.7677	190	127
20	20.95	1.75	.7874	190	127
20½	21.55	1.80	.8071	190	127
21	22.75	1.90	.8268	190	127
21½	23.05	1.95	.8465	190	127
22	23.35	1.95	.8661	190	127
22½	23.95	2.00	.8858	190	127
23	24.55	2.05	.9055	190	127
23½	25.15	2.10	.9252	190	127
24	25.75	2.15	.9449	190	125
24½	26.95	2.25	.9646	190	125
25	28.15	2.35	.9842	190	125

Our Bit Stock Drills will fit any brace in the market, and will drill steel, iron, or other metals as well as wood. They are not injured by contact with screws or nails, and will bore straight any kind of wood without splitting it.

## No. 109 E.

## TAPER SQUARE SHANK DRILLS

## FITTING RATCHETS.



Small Shank or No. 1. Size of Shank  $\frac{3}{8}$  inch x  $\frac{5}{8}$  inch x  $1\frac{1}{2}$  inches.

This size Shank always furnished unless otherwise specified.

Diameter, Inches.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.	Diameter, Inches.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.
$\frac{1}{8}$	\$ .90	$4\frac{3}{16}$	$1\frac{1}{16}$	$\frac{3}{32}$	\$1.90	$7\frac{1}{4}$	$4\frac{1}{16}$
$\frac{5}{32}$	.95	$4\frac{7}{16}$	$2\frac{3}{32}$	$\frac{7}{8}$	2.05	$7\frac{1}{2}$	$5\frac{3}{16}$
$\frac{3}{16}$	.95	$4\frac{1}{16}$	$2\frac{5}{16}$	$\frac{3}{16}$	2.20	$7\frac{3}{4}$	$5\frac{7}{16}$
$\frac{7}{32}$	1.00	$4\frac{1}{8}$	$2\frac{1}{2}$	$\frac{1}{8}$	2.30	8	$5\frac{1}{16}$
$\frac{1}{4}$	1.00	5	$2\frac{9}{16}$	$\frac{3}{16}$	2.40	$8\frac{1}{4}$	$5\frac{1}{8}$
$\frac{9}{32}$	1.05	5	$2\frac{9}{16}$	1	2.55	$8\frac{1}{2}$	$6\frac{3}{16}$
$\frac{5}{16}$	1.10	5	$2\frac{9}{16}$	$1\frac{1}{32}$	2.70	$8\frac{3}{4}$	$6\frac{7}{16}$
$\frac{11}{32}$	1.15	5	$2\frac{3}{4}$	$1\frac{1}{16}$	2.85	9	$6\frac{1}{16}$
$\frac{3}{8}$	1.20	6	$3\frac{3}{4}$	$1\frac{3}{32}$	3.00	9	$6\frac{1}{8}$
$\frac{13}{32}$	1.25	$6\frac{1}{4}$	4	$1\frac{1}{8}$	3.10	9	$6\frac{1}{8}$
$\frac{7}{16}$	1.25	$6\frac{1}{4}$	4	$1\frac{5}{32}$	3.25	9	$6\frac{1}{8}$
$\frac{15}{32}$	1.30	$6\frac{1}{4}$	4	$1\frac{1}{16}$	3.35	9	$6\frac{1}{8}$
$\frac{1}{2}$	1.30	$6\frac{1}{2}$	$4\frac{1}{4}$	$1\frac{7}{32}$	3.50	9	$6\frac{1}{8}$
$\frac{17}{32}$	1.35	$6\frac{1}{2}$	$4\frac{1}{4}$	$1\frac{1}{4}$	3.65	9	$6\frac{1}{8}$
$\frac{9}{16}$	1.35	$6\frac{1}{2}$	$4\frac{1}{4}$	$1\frac{3}{16}$	3.75	9	$6\frac{1}{8}$
$\frac{19}{32}$	1.40	$6\frac{1}{2}$	$4\frac{1}{4}$	$1\frac{1}{8}$	3.90	9	$6\frac{1}{8}$
$\frac{5}{8}$	1.40	$6\frac{1}{2}$	$4\frac{1}{4}$	$1\frac{1}{2}$	4.05	9	$6\frac{1}{8}$
$\frac{21}{32}$	1.45	$6\frac{1}{2}$	$4\frac{3}{16}$	$1\frac{3}{8}$	4.20	9	$6\frac{1}{8}$
$\frac{11}{16}$	1.45	$6\frac{1}{2}$	$4\frac{3}{16}$	$1\frac{1}{2}$	4.35	9	$6\frac{1}{8}$
$\frac{23}{32}$	1.50	$6\frac{1}{2}$	$4\frac{3}{16}$	$1\frac{7}{16}$	4.50	9	$6\frac{1}{8}$
$\frac{3}{4}$	1.55	$6\frac{1}{2}$	$4\frac{7}{16}$	$1\frac{1}{2}$	4.65	9	$6\frac{1}{8}$
$\frac{25}{32}$	1.65	$6\frac{3}{4}$	$4\frac{7}{16}$	$1\frac{1}{2}$	4.80	9	$6\frac{1}{8}$
$\frac{13}{16}$	1.75	7	$4\frac{11}{16}$				

Parties ordering Taper Square Shank Drills for Packer Ratchets will please state number of ratchet and name of manufacturer.  
6th sizes furnished at price of next larger size.

**No. 109½ E.**  
**TAPER SQUARE SHANK DRILLS**

FITTING RATCHETS.  
 MILLIMETER SIZES.



Small Shank or No. 1. Size of Shank 9½ x 16 x 38 M. M.  
 This size Shank always furnished unless otherwise specified.

Diameter, M. M.	Price Each.	Whole Length, M. M.	Twist Cut, M. M.	Diameter in Decimals of 1 Inch.
19½	\$1.65	171	113	.7677
20	1.65	171	113	.7874
20½	1.75	178	119	.8071
21	1.85	184	125	.8268
21½	1.95	184	125	.8465
22	2.05	190	132	.8661
22½	2.15	197	138	.8858
23	2.20	197	138	.9055
23½	2.25	203	144	.9252
24	2.30	203	144	.9449
24½	2.40	210	151	.9646
25	2.50	216	157	.9842
25½	2.60	216	157	1.0039
26	2.70	222	164	1.0236
26½	2.75	229	170	1.0433
27	2.85	229	170	1.0630
27½	3.00	229	170	1.0827
28	3.05	229	170	1.1024
28½	3.10	229	170	1.1220
29	3.25	229	170	1.1417
29½	3.30	229	170	1.1614
30	3.35	229	170	1.1811
30½	3.40	229	170	1.2008
31	3.50	229	170	1.2205
31½	3.65	229	170	1.2402
32	3.70	229	170	1.2598
33	3.90	229	170	1.2992
34	4.05	229	170	1.3386
35	4.20	229	170	1.3779
36	4.45	229	170	1.4173
37	4.65	229	170	1.4567
38	4.80	229	170	1.4961

Parties ordering Taper Square Shank Drills for Packer Ratchets will please state number of ratchet and name of manufacturer.

**No. 109½ E.**  
**TAPER SQUARE SHANK DRILLS**  
**FITTING RATCHETS.**  
**MILLIMETER SIZES.**



Small Shank or No. 1. Size of Shank 9½ x 16 x 38 M. M.  
 This size Shank always furnished unless otherwise specified.

Diameter, M. M.	Price Each.	Whole Length, M. M.	Twist Cut, M. M.	Diameter in Decimals of 1 Inch.
3	\$ .85	106	43	.1181
3½	.85	110	46	.1378
4	.90	113	51	.1575
4½	.90	119	56	.1772
5	.95	119	62	.1968
5½	1.00	122	67	.2165
6	1.00	124	67	.2362
6½	1.00	127	65	.2559
7	1.05	127	65	.2756
7½	1.10	127	65	.2953
8	1.10	127	65	.3150
8½	1.15	127	70	.3346
9	1.20	152	95	.3543
9½	1.20	152	95	.3740
10	1.25	159	102	.3937
10½	1.25	159	102	.4134
11	1.25	159	102	.4331
11½	1.30	159	102	.4528
12	1.30	159	102	.4724
12½	1.30	165	108	.4921
13	1.35	165	108	.5118
13½	1.35	165	108	.5315
14	1.35	165	108	.5512
14½	1.40	165	108	.5709
15	1.40	165	108	.5905
15½	1.40	165	108	.6102
16	1.45	165	108	.6299
16½	1.45	165	106	.6496
17	1.45	165	106	.6693
17½	1.50	165	106	.6890
18	1.50	165	106	.7087
18½	1.55	165	106	.7283
19	1.55	165	106	.7480

Parties ordering Taper Square Shank Drills for Packer Ratchets will please state number of ratchet and name of manufacturer.

**No. 109½ E.**  
**TAPER SQUARE SHANK DRILLS**  
 FITTING RATCHETS.  
 MILLIMETER SIZES.



Large Shank or No. 2 Size of Shank 12½ x 19 x 44½ M. M.

Diameter, M. M.	Price Each.	Whole Length, M. M.	Twist Cut, M. M.	Diameter in Decimals of 1 Inch.
19½	\$1.65	171	106	.7677
20	1.65	171	106	.7874
20½	1.75	178	113	.8071
21	1.85	184	119	.8268
21½	1.95	184	119	.8465
22	2.05	190	125	.8661
22½	2.15	197	132	.8858
23	2.20	197	132	.9055
23½	2.25	203	138	.9252
24	2.30	203	138	.9449
24½	2.40	210	144	.9646
25	2.50	216	151	.9842
25½	2.60	216	151	1.0039
26	2.70	222	157	1.0236
26½	2.75	229	164	1.0433
27	2.85	229	164	1.0630
27½	3.00	229	164	1.0827
28	3.05	229	164	1.1024
28½	3.10	229	164	1.1220
29	3.25	229	164	1.1417
29½	3.30	229	164	1.1614
30	3.35	229	164	1.1811
30½	3.40	229	164	1.2008
31	3.50	229	164	1.2205
31½	3.65	229	164	1.2402
32	3.70	229	164	1.2598
33	3.90	229	164	1.2992
34	4.05	229	164	1.3386
35	4.20	229	164	1.3779
36	4.45	229	164	1.4173
37	4.65	229	164	1.4567
38	4.80	229	164	1.4961

Parties ordering Taper Square Shank Drills for Packer Ratchet will please state number of ratchet and name of manufacturer.

## DRILLS WITH SHANKS AS PER LIST No. 110 ON PAGES 80-81 WILL FIT DRILL PRESSES OF

BOYNTON & PLUMMER, Worcester, Mass., . . . . .	All sizes except Nos. 14, 15, 16
BUDA FOUNDRY & MFG. Co., Harvey, Ill., . . . . .	Paulus Track Drills
CANEDY-OTTO MFG. Co., Chicago Heights, Ill.	
ASA GODDARD, Worcester, Mass., . . . . .	No. 3
ILLINOIS IRON & BOLT Co., Carpentersville, Ill., . . . . .	Bailey No. 5 and Illinois Upright
B. B. NOYES & Co., Greenfield, Mass., . . . . .	All sizes Little Giant Drills
FRANCIS REED Co., Worcester, Mass., . . . . .	Nos. 3, 6, 7, 12, 14, 19
SILVER MFG. Co., Salem, Ohio, . . . . .	Nos. 3, 4
WILEY & RUSSELL MFG. Co., Greenfield, Mass., . . . . .	Nos. 732, 742, 743, 744, 745
CHAMPION BLOWER FORGE Co., Lancaster, Pa., . . . . .	All sizes if ordered
D. H. POTTS, Lancaster, Penn., . . . . .	Nos. 1, 2, 3½, 10, 11, 12

## DRILLS WITH SHANKS AS PER LISTS Nos. 111 and 112 ON PAGES 82-85 WILL FIT DRILL PRESSES OF

BOYNTON & PLUMMER, Worcester, Mass., . . . . .	All sizes except Nos. 14, 15, 16
BUFFALO FORGE Co., Buffalo, N. Y., . . . . .	All sizes
CANEDY-OTTO MFG. Co., Chicago Heights, Ill.	
CHAMPION BLOWER & FORGE Co., Lancaster, Pa., . . . . .	All sizes
ASA GODDARD, Worcester, Mass., . . . . .	Nos. 2, 4
ILLINOIS IRON & BOLT Co., Carpentersville, Ill., . . . . .	Bailey Nos. 2, 3, 4; 0, 1, Handy
D. H. POTTS, Lancaster, Pa., . . . . .	All sizes
FRANCIS REED Co., Worcester, Mass., . . . . .	Nos. 0, 1, 1½, 2, 5, 8, 9, 11, 13, 18
SILVER MFG. Co., Salem, Ohio, . . . . .	Nos. 1, 1½, 2, 3, 12, 13, 14
GEO. C. TAFT, Worcester, Mass., . . . . .	No. 2 old or new style or horizontal, 2½, 3
WILEY & RUSSELL MFG. Co., Greenfield, Mass., . . . . .	Nos. 701, 706, 730, 731, 740, 751
M. L. EDWARDS Co., Salem, Ohio, . . . . .	All sizes
B. B. NOYES & Co., Greenfield, Mass., . . . . .	Nos. 2, 4, 5, 6, 12, 14, 16, 18, D5
GEO. S. COMSTOCK, Mechanicsburg, Pa., . . . . .	Comstock's Ball Bearing Fig. 500

## DRILLS WITH MORSE TAPER SHANKS AS PER LIST No. 102 ON PAGES 14-30 WILL FIT DRILL PRESSES OF

AURORA TOOL WORKS, Aurora, Ind.  
 W. F. & JOHN BARNES Co., Rockford, Ill.  
 BICKFORD DRILL Co., Cincinnati, Ohio.  
 HENDEY MACHINE Co., Torrington, Conn.  
 NEW HAVEN MFG. Co., New Haven, Conn.  
 NILES TOOL WORKS, Hamilton, Ohio.  
 POND MACHINE TOOL Co., Plainfield, N. J.  
 PUTNAM MACHINE Co., Fitchburg, Mass.  
 PRENTICE BROS., Worcester, Mass.  
 SIGOURNEY TOOL Co., Hartford, Conn.  
 CINCINNATI MACHINE TOOL Co., Cincinnati, Ohio.

NOTE.—In ordering drills for above, specify manufacturer and size of press or list number of drills desired.

## No. 110.

## DRILLS

FITTING COE'S BLACKSMITHS' DRILL PRESS AND  
PRENTICE DRILL PRESS No. 3.

## STYLE NO. 1



## STYLE NO. 2



Shanks .647 inch exact diameter (about  $\frac{1}{16}$  inch) and  $2\frac{1}{4}$  inches long.  
Style No. 2 always furnished unless otherwise ordered.

Diameter, Inches.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.	Diameter, Inches.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.
$\frac{1}{8}$	\$.55	$4\frac{7}{8}$	$2\frac{3}{16}$	$\frac{29}{64}$	\$.93	6	3
$\frac{9}{64}$	.58	5	$2\frac{5}{16}$	$\frac{15}{32}$	.93	6	3
$\frac{5}{32}$	.58	$5\frac{1}{8}$	$2\frac{7}{16}$	$\frac{31}{64}$	.95	6	3
$\frac{11}{64}$	.60	$5\frac{1}{4}$	$2\frac{9}{16}$	$\frac{1}{2}$	.95	6	3
$\frac{1}{16}$	.60	$5\frac{1}{2}$	$2\frac{11}{16}$	$\frac{33}{64}$	.98	6	3
$\frac{13}{64}$	.65	$5\frac{5}{8}$	$2\frac{7}{8}$	$\frac{17}{32}$	.98	6	3
$\frac{7}{32}$	.65	$5\frac{3}{4}$	3	$\frac{35}{64}$	1.00	6	3
$\frac{15}{64}$	.70	$5\frac{7}{8}$	3	$\frac{9}{16}$	1.00	6	3
$\frac{1}{4}$	.70	6	3	$\frac{37}{64}$	1.03	6	3
$\frac{17}{64}$	.73	6	3	$\frac{19}{32}$	1.03	6	3
$\frac{3}{32}$	.73	6	3	$\frac{39}{64}$	1.05	6	3
$\frac{19}{64}$	.75	6	3	$\frac{5}{8}$	1.05	6	3
$\frac{5}{16}$	.75	6	3	$\frac{41}{64}$	1.10	6	3
$\frac{21}{64}$	.80	6	3	$\frac{21}{32}$	1.10	6	3
$\frac{11}{32}$	.80	6	3	$\frac{43}{64}$	1.15	6	3
$\frac{23}{64}$	.85	6	3	$\frac{11}{16}$	1.15	6	3
$\frac{3}{8}$	.85	6	3	$\frac{45}{64}$	1.20	6	3
$\frac{25}{64}$	.88	6	3	$\frac{23}{32}$	1.20	6	3
$\frac{13}{32}$	.88	6	3	$\frac{47}{64}$	1.25	6	3
$\frac{27}{64}$	.90	6	3	$\frac{3}{4}$	1.25	6	3
$\frac{7}{16}$	.90	6	3				

For list of Blacksmiths' Drill Presses see page 79.



**No. 110.****DRILLS**

**FITTING COE'S BLACKSMITHS' DRILL PRESS AND  
PRENTICE DRILL PRESS No. 3**

**STYLE NO. 1****STYLE NO. 2**

Shanks .647 inch exact diameter (about  $\frac{1}{16}$  inch) and 2 $\frac{1}{4}$  inches long.  
Style No. 2 always furnished unless otherwise ordered.

Diameter, Inches.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.	Diameter, Inches.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.
$\frac{1}{16}$	\$1.30	6	3	$1\frac{5}{32}$	\$2.25	6	3
$\frac{3}{32}$	1.30	6	3	$1\frac{3}{16}$	2.30	6	3
$\frac{5}{64}$	1.35	6	3	$1\frac{1}{2}$	2.35	6	3
$\frac{1}{8}$	1.35	6	3	$1\frac{1}{4}$	2.40	6	3
$\frac{3}{16}$	1.40	6	3	$1\frac{3}{8}$	2.50	6	3
$\frac{1}{4}$	1.40	6	3	$1\frac{5}{8}$	2.60	6	3
$\frac{5}{16}$	1.45	6	3	$1\frac{3}{4}$	2.70	6	3
$\frac{3}{8}$	1.45	6	3	$1\frac{7}{8}$	2.80	6	3
$\frac{7}{16}$	1.55	6	3	$1\frac{1}{2}$	2.90	6	3
$\frac{1}{2}$	1.55	6	3	$1\frac{1}{4}$	3.00	6	3
$\frac{5}{8}$	1.60	6	3	$1\frac{3}{8}$	3.10	6	3
$\frac{3}{4}$	1.60	6	3	$1\frac{1}{2}$	3.20	6	3
$\frac{7}{8}$	1.70	6	3	* $1\frac{5}{8}$	3.40	6	3
1	1.70	6	3	$1\frac{5}{8}$	3.60	6	3
$1\frac{1}{32}$	1.80	6	3	$1\frac{1}{2}$	3.80	6	3
$1\frac{1}{16}$	1.80	6	3	$1\frac{3}{4}$	4.05	6	3
$1\frac{1}{8}$	1.90	6	3	$1\frac{7}{8}$	4.30	6	3
$1\frac{3}{16}$	2.00	6	3	2	4.50	6	3
$1\frac{1}{4}$	2.10	6	3		4.75	6	3
$1\frac{3}{8}$	2.20	6	3		5.00	6	3

\*Drills  $1\frac{1}{4}$  and larger take a different discount than  $1\frac{1}{2}$  inches and smaller.  
32nd sizes not listed furnished at prices intermediate, and 64th sizes at price of next larger 32nd size.

For list of Blacksmiths' Drill Presses see page 79.

## No. 111.

## TAPER LENGTH DRILLS

FITTING THE PRENTICE BLACKSMITHS' DRILL PRESSES NOS. 1 AND 2.

STYLE NO. 1



STYLE NO. 2

Shanks  $\frac{1}{2}$  inch diameter,  $2\frac{1}{2}$  inches long.

Style No. 2 always furnished unless otherwise ordered.

Diameter, Inches.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.	Diameter, Inches.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.
$\frac{1}{8}$	\$ .45	$5\frac{1}{8}$	$2\frac{3}{16}$	$\frac{3}{4}$	\$ .90	$7\frac{1}{4}$	4
$\frac{9}{64}$	.45	$5\frac{1}{4}$	$2\frac{1}{8}$	$\frac{7}{16}$	.90	$7\frac{1}{4}$	4
$\frac{5}{32}$	.45	$5\frac{3}{8}$	$2\frac{1}{8}$	$\frac{23}{64}$	.95	$7\frac{1}{2}$	$4\frac{1}{4}$
$\frac{11}{64}$	.50	$5\frac{1}{2}$	$2\frac{9}{16}$	$\frac{15}{32}$	.95	$7\frac{1}{2}$	$4\frac{1}{4}$
$\frac{3}{16}$	.50	$5\frac{3}{4}$	$2\frac{13}{16}$	$\frac{31}{64}$	1.00	$7\frac{3}{4}$	$4\frac{1}{2}$
$\frac{13}{64}$	.55	$5\frac{7}{8}$	$2\frac{7}{8}$	$\frac{1}{2}$	1.00	$7\frac{3}{4}$	$4\frac{1}{2}$
$\frac{7}{32}$	.55	6	3	$\frac{33}{64}$	1.10	8	$4\frac{3}{4}$
$\frac{15}{64}$	.60	$6\frac{1}{8}$	3	$\frac{17}{32}$	1.10	8	$4\frac{3}{4}$
$\frac{1}{4}$	.60	$6\frac{1}{4}$	3	$\frac{35}{64}$	1.20	$8\frac{1}{4}$	5
$\frac{17}{64}$	.65	$6\frac{1}{4}$	3	$\frac{9}{16}$	1.20	$8\frac{1}{4}$	5
$\frac{9}{32}$	.65	$6\frac{1}{4}$	3	$\frac{37}{64}$	1.30	$8\frac{1}{2}$	$5\frac{1}{4}$
$\frac{19}{64}$	.70	$6\frac{3}{8}$	$3\frac{1}{8}$	$\frac{19}{32}$	1.30	$8\frac{1}{2}$	$5\frac{1}{4}$
$\frac{5}{16}$	.70	$6\frac{3}{8}$	$3\frac{1}{8}$	$\frac{39}{64}$	1.40	$8\frac{3}{4}$	$5\frac{1}{2}$
$\frac{21}{64}$	.75	$6\frac{1}{2}$	$3\frac{1}{4}$	$\frac{5}{8}$	1.40	$8\frac{3}{4}$	$5\frac{1}{2}$
$\frac{11}{32}$	.75	$6\frac{1}{2}$	$3\frac{1}{4}$	$\frac{41}{64}$	1.50	9	$5\frac{3}{4}$
$\frac{23}{64}$	.80	$6\frac{3}{4}$	$3\frac{1}{2}$	$\frac{31}{32}$	1.50	9	$5\frac{3}{4}$
$\frac{3}{8}$	.80	$6\frac{3}{4}$	$3\frac{1}{2}$	$\frac{43}{64}$	1.60	$9\frac{1}{4}$	6
$\frac{25}{64}$	.85	7	$3\frac{3}{4}$	$\frac{11}{16}$	1.60	$9\frac{1}{4}$	6
$\frac{13}{32}$	.85	7	$3\frac{3}{4}$	$\frac{45}{64}$	1.70	$9\frac{1}{2}$	$6\frac{1}{4}$

For list of Blacksmiths' Drill Presses see page 79.

## No. 111.

## TAPER LENGTH DRILLS

FITTING THE PRENTICE BLACKSMITHS' DRILL PRESSES NOS. 1 AND 2.

STYLE NO. 1



STYLE NO. 2



Shanks  $\frac{1}{4}$  inch diameter,  $2\frac{1}{2}$  inches long.  
 Style No. 2 always furnished unless otherwise ordered.

Diameter, Inches.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.	Diameter, Inches.	Price Each.	Whole Length, Inches.	Twist, Cut, Inches.
$\frac{3}{32}$	\$1.70	$9\frac{1}{2}$	$6\frac{1}{4}$	1	3.00	11	$7\frac{3}{8}$
$\frac{4}{32}$	1.85	$9\frac{3}{4}$	$6\frac{1}{2}$	$1\frac{1}{32}$	3.20	$11\frac{1}{8}$	$7\frac{1}{2}$
$\frac{5}{32}$	1.85	$9\frac{3}{4}$	$6\frac{1}{2}$	$1\frac{1}{16}$	3.40	$11\frac{1}{4}$	$7\frac{5}{8}$
$\frac{6}{32}$	2.00	$9\frac{7}{8}$	$6\frac{5}{8}$	$1\frac{3}{32}$	3.60	$11\frac{1}{2}$	$7\frac{7}{8}$
$\frac{7}{32}$	2.00	$9\frac{7}{8}$	$6\frac{5}{8}$	$1\frac{1}{8}$	3.80	$11\frac{3}{4}$	8
$\frac{8}{32}$	2.15	10	$6\frac{3}{4}$	$1\frac{5}{32}$	4.00	$11\frac{7}{8}$	$8\frac{1}{8}$
$\frac{9}{32}$	2.15	10	$6\frac{3}{4}$	$1\frac{3}{16}$	4.20	12	$8\frac{1}{4}$
$\frac{10}{32}$	2.30	$10\frac{1}{4}$	7	$1\frac{7}{32}$	4.40	$12\frac{1}{8}$	$8\frac{3}{8}$
$\frac{11}{32}$	2.30	$10\frac{1}{4}$	7	$1\frac{1}{4}$	4.50	$12\frac{1}{2}$	$8\frac{3}{8}$
$\frac{12}{32}$	2.45	$10\frac{1}{2}$	$7\frac{1}{4}$	$1\frac{9}{32}$	4.65	$12\frac{1}{2}$	$8\frac{5}{8}$
$\frac{13}{32}$	2.45	$10\frac{1}{2}$	$7\frac{1}{4}$	$1\frac{1}{8}$	4.80	$12\frac{1}{2}$	$8\frac{5}{8}$
$\frac{14}{32}$	2.60	$10\frac{5}{8}$	$7\frac{3}{8}$	$1\frac{1}{4}$	5.00	$12\frac{1}{2}$	$8\frac{5}{8}$
$\frac{15}{32}$	2.60	$10\frac{5}{8}$	$7\frac{3}{8}$	$1\frac{3}{8}$	5.20	$12\frac{1}{2}$	$8\frac{1}{2}$
$\frac{16}{32}$	2.75	$10\frac{3}{4}$	$7\frac{1}{2}$	$1\frac{1}{2}$	5.40	$12\frac{1}{2}$	$8\frac{1}{2}$
$\frac{17}{32}$	2.75	$10\frac{3}{4}$	$7\frac{1}{2}$	$1\frac{5}{16}$	5.60	$12\frac{1}{2}$	$8\frac{1}{2}$
$\frac{18}{32}$	2.90	$10\frac{7}{8}$	$7\frac{5}{8}$	$1\frac{3}{4}$	5.80	$12\frac{1}{2}$	$8\frac{1}{2}$
$\frac{19}{32}$	2.90	$10\frac{7}{8}$	$7\frac{5}{8}$	$1\frac{1}{2}$	6.00	$12\frac{1}{2}$	$8\frac{3}{8}$
$\frac{20}{32}$	3.00	11	$7\frac{3}{4}$				

For list of Blacksmiths' Drill Presses see page 79.  
 64th sizes not listed furnished at price of next larger size.

## No. 112.

## SHORT LENGTH DRILLS

FITTING SILVER & DEMING'S AND PRENTICE BLACKSMITHS' DRILL  
PRESSES NOS. 1 AND 2.

STYLE NO. 1.



STYLE NO. 2.



Shanks  $\frac{1}{2}$  inch diameter,  $2\frac{1}{2}$  inches long.

Style No. 2 always furnished unless otherwise ordered.

Diameter, Inches.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.	Diameter, Inches.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.
$\frac{1}{8}$	\$ .45	$5\frac{1}{8}$	$2\frac{3}{16}$	$\frac{13}{32}$	\$ .78	6	$2\frac{3}{4}$
$\frac{9}{64}$	.45	$5\frac{1}{4}$	$2\frac{5}{16}$	$\frac{27}{64}$	.80	6	$2\frac{3}{4}$
$\frac{5}{32}$	.45	$5\frac{3}{8}$	$2\frac{7}{16}$	$\frac{1}{16}$	.80	6	$2\frac{3}{4}$
$\frac{11}{64}$	.50	$5\frac{1}{2}$	$2\frac{9}{16}$	$\frac{23}{64}$	.83	6	$2\frac{3}{4}$
$\frac{3}{16}$	.50	$5\frac{3}{4}$	$2\frac{11}{16}$	$\frac{15}{32}$	.83	6	$2\frac{3}{4}$
$\frac{13}{64}$	.55	$5\frac{7}{8}$	$2\frac{7}{8}$	$\frac{31}{64}$	.85	6	$2\frac{3}{4}$
$\frac{7}{32}$	.55	6	3	$\frac{1}{2}$	.85	6	$2\frac{3}{4}$
$\frac{15}{64}$	.60	6	3	$\frac{33}{64}$	.88	6	$2\frac{3}{4}$
$\frac{1}{4}$	.60	6	3	$\frac{17}{32}$	.88	6	$2\frac{3}{4}$
$\frac{17}{64}$	.65	6	$2\frac{3}{4}$	$\frac{35}{64}$	.90	6	$2\frac{3}{4}$
$\frac{3}{16}$	.65	6	$2\frac{3}{4}$	$\frac{1}{16}$	.90	6	$2\frac{3}{4}$
$\frac{19}{64}$	.70	6	$2\frac{3}{4}$	$\frac{37}{64}$	1.00	6	$2\frac{3}{4}$
$\frac{1}{8}$	.70	6	$2\frac{3}{4}$	$\frac{19}{32}$	1.00	6	$2\frac{3}{4}$
$\frac{21}{64}$	.73	6	$2\frac{3}{4}$	$\frac{39}{64}$	1.05	6	$2\frac{3}{4}$
$\frac{11}{32}$	.73	6	$2\frac{3}{4}$	$\frac{5}{8}$	1.05	6	$2\frac{3}{4}$
$\frac{23}{64}$	.75	6	$2\frac{3}{4}$	$\frac{41}{64}$	1.10	6	$2\frac{3}{4}$
$\frac{3}{8}$	.75	6	$2\frac{3}{4}$	$\frac{21}{32}$	1.10	6	$2\frac{3}{4}$
$\frac{25}{64}$	.78	6	$2\frac{3}{4}$	$\frac{43}{64}$	1.15	6	$2\frac{3}{4}$

For list of Blacksmiths' Drill Presses see page 79.

## No. 112.

## SHORT LENGTH DRILLS

FITTING SILVER & DEMING'S AND PRENTICE BLACKSMITHS'  
DRILL PRESSES NOS. 1 AND 2.

STYLE NO. 1



STYLE NO. 2



Shanks  $\frac{1}{2}$  inch diameter,  $2\frac{1}{2}$  inches long.  
Style No. 2 always furnished unless otherwise ordered.

Diameter, Inches.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.	Diameter, Inches.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.
$\frac{11}{16}$	\$ 1.15	6	$2\frac{3}{4}$	$\frac{53}{64}$	1.80	6	$2\frac{3}{4}$
$\frac{45}{64}$	1.20	6	$2\frac{3}{4}$	1	1.80	6	$2\frac{3}{4}$
$\frac{33}{64}$	1.20	6	$2\frac{3}{4}$	$1\frac{1}{32}$	1.90	6	$2\frac{3}{4}$
$\frac{47}{64}$	1.25	6	$2\frac{3}{4}$	$1\frac{1}{16}$	2.00	6	$2\frac{3}{4}$
$\frac{3}{4}$	1.25	6	$2\frac{3}{4}$	$1\frac{3}{32}$	2.10	6	$2\frac{3}{4}$
$\frac{49}{64}$	1.30	6	$2\frac{3}{4}$	$1\frac{1}{8}$	2.20	6	$2\frac{3}{4}$
$\frac{35}{32}$	1.30	6	$2\frac{3}{4}$	$1\frac{3}{32}$	2.25	6	$2\frac{3}{4}$
$\frac{51}{64}$	1.35	6	$2\frac{3}{4}$	$1\frac{1}{16}$	2.30	6	$2\frac{3}{4}$
$\frac{13}{16}$	1.35	6	$2\frac{3}{4}$	$1\frac{7}{32}$	2.35	6	$2\frac{3}{4}$
$\frac{53}{64}$	1.40	6	$2\frac{3}{4}$	$1\frac{1}{4}$	2.40	6	$2\frac{3}{4}$
$\frac{47}{64}$	1.40	6	$2\frac{3}{4}$	$1\frac{9}{32}$	2.50	6	$2\frac{3}{4}$
$\frac{55}{64}$	1.45	6	$2\frac{3}{4}$	$1\frac{5}{16}$	2.60	6	$2\frac{3}{4}$
$\frac{7}{8}$	1.45	6	$2\frac{3}{4}$	$1\frac{11}{32}$	2.70	6	$2\frac{3}{4}$
$\frac{57}{64}$	1.55	6	$2\frac{3}{4}$	$1\frac{3}{8}$	2.80	6	$2\frac{3}{4}$
$\frac{39}{32}$	1.55	6	$2\frac{3}{4}$	$1\frac{13}{32}$	2.90	6	$2\frac{3}{4}$
$\frac{59}{64}$	1.60	6	$2\frac{3}{4}$	$1\frac{7}{16}$	3.00	6	$2\frac{3}{4}$
$\frac{15}{16}$	1.60	6	$2\frac{3}{4}$	$1\frac{15}{32}$	3.10	6	$2\frac{3}{4}$
$\frac{61}{64}$	1.70	6	$2\frac{3}{4}$	$1\frac{1}{2}$	3.20	6	$2\frac{3}{4}$
$\frac{31}{32}$	1.70	6	$2\frac{3}{4}$				

For list of Blacksmiths' Drill Presses see page 79.  
64th sizes not listed furnished at price of next larger size.

## No. 114A.

## STRAIGHT SHANK STRAIGHTWAY DRILLS.



## JOBBER'S' LENGTHS.

Diameter, Inches.	Price Per Dozen.	Price Each.	Whole Length, Inches.	Length of Flute, Inches.
$\frac{1}{16}$	\$1.00	\$ .09	$2\frac{1}{2}$	$1\frac{1}{4}$
$\frac{5}{64}$	1.10	.10	$2\frac{5}{8}$	$1\frac{3}{8}$
$\frac{3}{32}$	1.20	.11	$2\frac{3}{4}$	$1\frac{1}{2}$
$\frac{7}{64}$	1.30	.12	$2\frac{7}{8}$	$1\frac{11}{16}$
$\frac{1}{8}$	1.45	.13	3	$1\frac{13}{16}$
$\frac{9}{64}$	1.60	.15	$3\frac{1}{8}$	$1\frac{15}{16}$
$\frac{5}{32}$	1.80	.16	$3\frac{1}{4}$	$2\frac{3}{32}$
$\frac{11}{64}$	2.00	.18	$3\frac{3}{8}$	$2\frac{1}{2}$
$\frac{3}{16}$	2.20	.20	$3\frac{1}{2}$	$2\frac{5}{16}$
$\frac{13}{64}$	2.40	.21	$3\frac{5}{8}$	$2\frac{17}{16}$
$\frac{7}{32}$	2.65	.23	$3\frac{3}{4}$	$2\frac{13}{16}$
$\frac{15}{64}$	2.90	.26	$3\frac{7}{8}$	$2\frac{31}{32}$
$\frac{1}{4}$	3.15	.28	4	$2\frac{3}{4}$
$\frac{17}{64}$	3.40	.30	$4\frac{1}{8}$	$2\frac{7}{8}$
$\frac{9}{32}$	3.65	.32	$4\frac{1}{4}$	$2\frac{31}{32}$
$\frac{19}{64}$	3.90	.35	$4\frac{3}{8}$	$3\frac{3}{32}$
$\frac{5}{16}$	4.20	.37	$4\frac{1}{2}$	$3\frac{1}{8}$
$\frac{21}{64}$	4.50	.40	$4\frac{5}{8}$	$3\frac{15}{16}$
$\frac{11}{32}$	4.80	.42	$4\frac{3}{4}$	$3\frac{13}{16}$
$\frac{23}{64}$	5.10	.45	$4\frac{7}{8}$	$3\frac{11}{16}$
$\frac{3}{8}$	5.40	.48	5	$3\frac{5}{8}$
$\frac{25}{64}$	5.70	.50	$5\frac{1}{8}$	$3\frac{3}{4}$
$\frac{13}{32}$	6.00	.53	$5\frac{1}{4}$	$3\frac{27}{32}$
$\frac{27}{64}$	6.40	.55	$5\frac{3}{8}$	$3\frac{31}{32}$
$\frac{7}{16}$	6.80	.59	$5\frac{1}{2}$	$4\frac{1}{16}$
$\frac{29}{64}$	7.20	.63	$5\frac{5}{8}$	$4\frac{3}{16}$
$\frac{15}{32}$	7.50	.65	$5\frac{3}{4}$	$4\frac{9}{32}$
$\frac{31}{64}$	7.75	.67	$5\frac{7}{8}$	$4\frac{11}{16}$
$\frac{1}{2}$	8.00	.70	6	$4\frac{1}{2}$

## No. 114 B.

## MORSE TAPER SHANK STRAIGHTWAY DRILLS.



Diameter, Inches.	Price Each.	Whole Length, Inches.	Length of Flute, Inches.	Morse Taper Shank.
$\frac{1}{4}$	\$ .60	$6\frac{1}{8}$	3	No. 1.
$\frac{5}{32}$	.65	$6\frac{1}{4}$	$2\frac{1}{2}$	
$\frac{3}{16}$	.70	$6\frac{3}{8}$	$3\frac{1}{8}$	
$\frac{1}{2}$	.75	$6\frac{1}{2}$	$3\frac{3}{8}$	
$\frac{3}{8}$	.80	$6\frac{3}{4}$	$3\frac{7}{8}$	
$\frac{1}{2}$	.85	7	$3\frac{1}{2}$	
$\frac{7}{16}$	.90	$7\frac{1}{4}$	$3\frac{1}{2}$	
$\frac{1}{2}$	.95	$7\frac{1}{2}$	$4\frac{3}{8}$	
$\frac{1}{2}$	1.00	$7\frac{3}{4}$	$4\frac{7}{8}$	
$\frac{1}{2}$	1.10	8	$4\frac{1}{2}$	
$\frac{1}{2}$	1.20	$8\frac{1}{4}$	$4\frac{1}{2}$	No. 2.
$\frac{1}{2}$	1.30	$8\frac{1}{2}$	$4\frac{5}{8}$	
$\frac{5}{8}$	1.40	$8\frac{3}{4}$	$4\frac{7}{8}$	
$\frac{3}{4}$	1.50	9	$5\frac{1}{8}$	
$\frac{1}{2}$	1.60	$9\frac{1}{4}$	$5\frac{3}{8}$	
$\frac{3}{4}$	1.70	$9\frac{1}{2}$	$5\frac{5}{8}$	
$\frac{3}{4}$	1.85	$9\frac{3}{4}$	$5\frac{7}{8}$	
$\frac{3}{4}$	2.00	$9\frac{7}{8}$	6	
$\frac{1}{2}$	2.15	10	$6\frac{1}{8}$	
$\frac{3}{4}$	2.30	$10\frac{1}{4}$	$6\frac{3}{8}$	
$\frac{7}{8}$	2.45	$10\frac{1}{2}$	$6\frac{5}{8}$	No. 3.
$\frac{3}{4}$	2.60	$10\frac{5}{8}$	$6\frac{3}{4}$	
$\frac{1}{2}$	2.75	$10\frac{3}{4}$	$6\frac{1}{8}$	
$\frac{3}{4}$	2.90	$10\frac{7}{8}$	$6\frac{1}{4}$	

The above furnished in 64th sizes if ordered and take price of the next larger size listed.

**No. 114B**  
**MORSE TAPER SHANK STRAIGHTWAY DRILLS.**



Diameter, Inches.	Price Each.	Whole Length, Inches.	Length of Flute, Inches.	Morse Taper Shank.
1	\$3.00	11	6 $\frac{3}{8}$	No. 3.
1 $\frac{1}{32}$	3.20	11 $\frac{1}{8}$	6 $\frac{1}{2}$	
1 $\frac{1}{16}$	3.40	11 $\frac{1}{4}$	6 $\frac{5}{8}$	
1 $\frac{3}{32}$	3.60	11 $\frac{1}{2}$	6 $\frac{7}{8}$	
1 $\frac{1}{8}$	3.80	11 $\frac{3}{4}$	7 $\frac{1}{8}$	
1 $\frac{5}{32}$	4.00	11 $\frac{7}{8}$	7 $\frac{1}{4}$	
1 $\frac{3}{16}$	4.20	12	7 $\frac{3}{8}$	
1 $\frac{7}{32}$	4.40	12 $\frac{1}{8}$	7 $\frac{1}{2}$	
1 $\frac{1}{4}$	4.50	12 $\frac{1}{2}$	7 $\frac{7}{8}$	
1 $\frac{9}{32}$	4.65	14 $\frac{1}{8}$	8 $\frac{1}{2}$	
1 $\frac{5}{16}$	4.80	14 $\frac{1}{4}$	8 $\frac{5}{8}$	
1 $\frac{11}{32}$	5.00	14 $\frac{3}{8}$	8 $\frac{3}{4}$	
1 $\frac{3}{8}$	5.20	14 $\frac{1}{2}$	8 $\frac{7}{8}$	
1 $\frac{13}{32}$	5.40	14 $\frac{5}{8}$	9	
1 $\frac{7}{16}$	5.60	14 $\frac{3}{4}$	9 $\frac{1}{8}$	No. 4.
1 $\frac{15}{32}$	5.80	14 $\frac{7}{8}$	9 $\frac{1}{4}$	
1 $\frac{1}{2}$	6.00	15	9 $\frac{3}{8}$	
*1 $\frac{17}{32}$	6.30	15	9 $\frac{3}{8}$	
1 $\frac{9}{16}$	6.60	15 $\frac{1}{4}$	9 $\frac{5}{8}$	
1 $\frac{19}{32}$	6.90	15 $\frac{1}{4}$	9 $\frac{5}{8}$	
1 $\frac{5}{8}$	7.20	15 $\frac{1}{2}$	9 $\frac{7}{8}$	
1 $\frac{21}{32}$	7.50	15 $\frac{1}{2}$	9 $\frac{7}{8}$	
1 $\frac{11}{16}$	7.80	15 $\frac{3}{4}$	10 $\frac{1}{8}$	
1 $\frac{23}{32}$	8.10	15 $\frac{3}{4}$	9 $\frac{11}{16}$	
1 $\frac{3}{4}$	8.40	16	9 $\frac{13}{16}$	
1 $\frac{25}{32}$	8.60	16	9 $\frac{15}{16}$	

The above furnished in 64th sizes if ordered and take price of the next larger size listed.

\*Drills 1 $\frac{17}{32}$  inches and larger take a different discount than 1 $\frac{1}{2}$  inches and smaller.



## No. 114 B.

## MORSE TAPER SHANK STRAIGHTWAY DRILLS.



Diameter, Inches.	Price Each.	Whole Length, Inches.	Length of Flute, Inches.	Morse Taper Shank.
$1\frac{1}{16}$	\$8.80	$16\frac{1}{4}$	$10\frac{1}{8}$	No. 4.
$1\frac{3}{16}$	9.00	$16\frac{1}{4}$	$10\frac{1}{8}$	
$1\frac{7}{8}$	9.20	$16\frac{1}{2}$	$10\frac{3}{8}$	
$1\frac{9}{16}$	9.35	$16\frac{1}{2}$	$10\frac{3}{8}$	
$1\frac{11}{16}$	9.50	$16\frac{1}{2}$	$10\frac{1}{4}$	
$1\frac{13}{16}$	9.65	$16\frac{1}{2}$	$10\frac{1}{4}$	
2	9.80	$16\frac{1}{2}$	$10\frac{1}{4}$	
$2\frac{1}{16}$	10.20	$16\frac{1}{2}$	$9\frac{1}{2}$	No. 5.
$2\frac{1}{8}$	10.60	17	10	
$2\frac{1}{4}$	11.20	17	10	
$2\frac{3}{8}$	12.00	17	10	
$2\frac{1}{2}$	12.80	$17\frac{1}{2}$	$10\frac{1}{8}$	
$2\frac{5}{8}$	13.60	$17\frac{1}{2}$	$10\frac{1}{8}$	
$2\frac{3}{4}$	14.40	18	$10\frac{1}{2}$	
$2\frac{7}{8}$	15.00	$18\frac{1}{2}$	11	
$2\frac{1}{2}$	15.60	19	$11\frac{3}{8}$	
$2\frac{9}{16}$	16.20	$19\frac{1}{4}$	$11\frac{5}{8}$	
$2\frac{5}{8}$	16.80	$19\frac{1}{2}$	$11\frac{3}{4}$	
$2\frac{11}{16}$	17.60	20	$12\frac{1}{4}$	
$2\frac{3}{4}$	19.00	$20\frac{1}{2}$	$12\frac{5}{8}$	
$2\frac{13}{16}$	20.00	$20\frac{1}{2}$	$12\frac{5}{8}$	
$2\frac{7}{8}$	21.00	21	13	
$2\frac{15}{16}$	23.00	21	13	
3	25.00	22	$13\frac{7}{8}$	

Drills  $1\frac{1}{16}$  inches and larger take a different discount than  $1\frac{1}{2}$  inches and smaller.

32nd sizes not listed furnished at intermediate prices, and 64th sizes at price of next larger 32nd size.

## No. 114½ B.

## STRAIGHT SHANK STRAIGHTWAY DRILLS.

## TAPER LENGTH.



Diameter, Inches.	Price Each.	Whole Length, Inches.	Length of Flute, Inches.	Diameter, Inches.	Price Each.	Whole Length, Inches.	Length of Flute, Inches.
¼	\$ .60	6½	4	3½	\$2.60	10⅝	7
⅜	.65	6¼	4	1½	2.75	10¾	7
½	.70	6⅜	4⅛	1⅝	2.90	10⅞	7⅛
⅝	.75	6½	4⅛	1	3.00	11	7⅜
¾	.80	6¾	4¼	1⅜	3.20	11⅛	7⅝
7⁄16	.85	7	4⅜	1⅞	3.40	11¼	7⅝
1⁄8	.90	7¼	4⅝	1⅝	3.60	11½	7⅝
9⁄16	.95	7½	4⅞	1⅞	3.80	11¾	7⅞
5⁄16	1.00	7¾	5	1⅝	4.00	11⅞	8
3⁄16	1.10	8	5¼	1⅞	4.20	12	8⅛
1⁄16	1.20	8¼	5⅜	1⅝	4.40	12⅛	8⅛
7⁄32	1.30	8½	5⅝	1¼	4.50	12½	8½
5⁄32	1.40	8¾	5¾	1⅜	4.65	14⅛	9⅛
3⁄32	1.50	9	5⅞	1⅞	4.80	14¼	9¼
1⁄16	1.60	9¼	6	1⅝	5.00	14⅜	9⅜
7⁄64	1.70	9½	6⅜	1⅞	5.20	14½	9½
5⁄64	1.85	9¾	6⅝	1⅝	5.40	14⅝	9½
3⁄64	2.00	9⅞	6½	1⅞	5.60	14¾	9⅝
1⁄32	2.15	10	6⅝	1⅝	5.80	14⅞	9¾
7⁄128	2.30	10¼	6¾	1½	6.00	15	9⅞
1⁄8	2.45	10½	7	*1⅝	6.30	15	9⅞

\*Drills 1⅝ inches and larger take a different discount than 1½ inches and smaller.  
64th sizes furnished at prices of next larger 32nd size.

**No. 114½ B.**  
**STRAIGHT SHANK STRAIGHTWAY DRILLS.**  
**TAPER LENGTH.**

Diameter, Inches.	Price Each.	Whole Length, Inches.	Length of Flute, Inches.	Diameter, Inches.	Price Each.	Whole Length, Inches.	Length of Flute, Inches.
1 $\frac{9}{16}$	6.60	15 $\frac{1}{4}$	9 $\frac{3}{4}$	2 $\frac{1}{8}$	10.60	17	10 $\frac{1}{8}$
1 $\frac{11}{16}$	6.90	15 $\frac{1}{4}$	9 $\frac{3}{4}$	2 $\frac{1}{8}$	11.20	17	10 $\frac{1}{8}$
1 $\frac{5}{8}$	7.20	15 $\frac{1}{2}$	10	2 $\frac{3}{8}$	12.00	17	10 $\frac{1}{8}$
1 $\frac{3}{4}$	7.50	15 $\frac{1}{2}$	10	2 $\frac{1}{4}$	12.80	17 $\frac{1}{2}$	10 $\frac{1}{4}$
1 $\frac{7}{8}$	7.80	15 $\frac{3}{4}$	10 $\frac{1}{4}$	2 $\frac{5}{8}$	13.60	17 $\frac{1}{2}$	10 $\frac{1}{4}$
1 $\frac{15}{16}$	8.10	15 $\frac{3}{4}$	10 $\frac{1}{4}$	2 $\frac{3}{4}$	14.40	18	10 $\frac{5}{8}$
1 $\frac{3}{4}$	8.40	16	10 $\frac{1}{2}$	2 $\frac{7}{8}$	15.00	18 $\frac{1}{2}$	11 $\frac{1}{8}$
1 $\frac{13}{16}$	8.60	16	10 $\frac{1}{2}$	2 $\frac{1}{2}$	15.60	19	11 $\frac{1}{2}$
1 $\frac{11}{8}$	8.80	16 $\frac{1}{4}$	10 $\frac{3}{4}$	2 $\frac{1}{8}$	16.20	19 $\frac{1}{4}$	11 $\frac{3}{4}$
1 $\frac{7}{4}$	9.00	16 $\frac{1}{4}$	10 $\frac{3}{4}$	2 $\frac{5}{8}$	16.80	19 $\frac{1}{2}$	11 $\frac{7}{8}$
1 $\frac{1}{2}$	9.20	16 $\frac{1}{2}$	11	2 $\frac{1}{4}$	17.60	20	12 $\frac{3}{8}$
1 $\frac{1}{4}$	9.35	16 $\frac{1}{2}$	11	2 $\frac{3}{4}$	19.00	20 $\frac{1}{2}$	12 $\frac{3}{4}$
1 $\frac{1}{8}$	9.50	16 $\frac{1}{2}$	11	2 $\frac{1}{8}$	20.00	20 $\frac{1}{2}$	12 $\frac{3}{4}$
1 $\frac{1}{16}$	9.65	16 $\frac{1}{2}$	11	2 $\frac{7}{8}$	21.00	21	13 $\frac{1}{8}$
2	9.80	16 $\frac{1}{2}$	11	2 $\frac{1}{2}$	23.00	21	13 $\frac{1}{8}$
2 $\frac{1}{2}$	10.20	16 $\frac{1}{2}$	9 $\frac{5}{8}$	3	25.00	22	14

32nd sizes not listed furnished at intermediate prices, and 64th sizes at price of next larger 32nd size.

**No. 114 C.**  
**STRAIGHT SHANK STRAIGHTWAY DRILLS.**



Number by Gauge.	Price Per Dozen.	Price Each.	Number by Gauge.	Price Per Dozen.	Price Each.
1 to 5	\$2.35	\$ .22	26 to 30	\$1.55	\$ .15
6 to 10	2.25	.21	31 to 35	1.40	.14
11 to 15	2.10	.20	36 to 40	1.25	.12
16 to 20	1.95	.19	41 to 45	1.10	.10
21 to 25	1.75	.17	46 to 60	.95	.09

For sizes in decimals of 1 inch, and for lengths, see pages 57-59.  
 For No. 114 D see page 144.

**No. 114 E.**  
**CENTER DRILLS.**



Diameter, Inches.	Price Per Doz.	Whole Length, Inches.	Twist Cut, Inches.	Diameter, Inches.	Price Per Doz.	Whole Length, Inches.	Twist Cut, Inches.
$\frac{1}{32}$	\$ .90	$1\frac{1}{8}$	$\frac{5}{8}$	$\frac{3}{16}$	\$1.90	$1\frac{1}{2}$	1
$\frac{3}{64}$	.90	$1\frac{1}{8}$	$\frac{5}{8}$	$\frac{1}{4}$	2.10	$1\frac{1}{2}$	1
$\frac{1}{8}$	.80	$1\frac{1}{4}$	$\frac{3}{4}$	$\frac{3}{8}$	2.35	$1\frac{1}{2}$	1
$\frac{5}{64}$	.90	$1\frac{1}{4}$	$\frac{3}{4}$	$\frac{1}{2}$	2.60	$1\frac{1}{2}$	1
$\frac{3}{16}$	1.10	$1\frac{1}{4}$	$\frac{3}{4}$	$\frac{3}{4}$	2.85	$1\frac{1}{2}$	1
$\frac{7}{64}$	1.20	$1\frac{1}{4}$	$\frac{3}{4}$	$\frac{1}{2}$	3.10	$1\frac{1}{2}$	1
$\frac{1}{4}$	1.25	$1\frac{1}{4}$	$\frac{3}{4}$	$\frac{3}{4}$	3.30	$1\frac{1}{2}$	1
$\frac{9}{64}$	1.35	$1\frac{1}{4}$	$\frac{3}{4}$	$\frac{1}{2}$	3.50	$1\frac{1}{2}$	1
$\frac{5}{16}$	1.50	$1\frac{1}{2}$	1	$\frac{3}{8}$	3.75	$1\frac{1}{2}$	1
$\frac{11}{64}$	1.70	$1\frac{1}{2}$	1				

**No. 114 F.**  
**CENTER DRILLS.**



No. by Gauge.	Price Per Doz.	Whole Length, Inches.	Twist Cut, Inches.	No. by Gauge.	Price Per Doz.	Whole Length, Inches.	Twist Cut, Inches.
30	\$1.55	$1\frac{1}{4}$	$\frac{3}{4}$	45	\$1.10	$1\frac{1}{4}$	$\frac{3}{4}$
35	1.40	$1\frac{1}{4}$	$\frac{3}{4}$	50	.95	$1\frac{1}{4}$	$\frac{3}{4}$
40	1.25	$1\frac{1}{4}$	$\frac{3}{4}$	55	.95	$1\frac{1}{4}$	$\frac{3}{4}$

For sizes in decimals of 1 inch see pages 58-59.

**No. 114 G.****CENTER DRILLS.****MILLIMETER SIZES**

Diameter, M. M.	Price Per Dozen.	Diameter in Decimals of 1 inch.	Whole Length, M. M.	Twist Cut, M. M.
1	\$ .90	.0393	27	13½
1½	.90	.0590	27	13½
2	.90	.0787	27	13½
2½	1.00	.0984	27	13½
3	1.00	.1181	27	13½
3½	1.10	.1378	27	13½
4	1.10	.1575	27	13½
4½	1.40	.1771	27	13½
5	1.40	.1968	27	13½

**No. 105 C.****TRACK DRILLS.**

Diameter, Inches.	Price Per Dozen.	Whole Length, Inches.	Twist Cut, Inches.	Decimal Equivalent.
¾	\$3.65	4¼	2¾	.2812

These drills are especially adapted for drilling rails for bonding work and are of a construction and temper guaranteed to give best results.

## No. 102 F.

## THREE-GROOVE DRILLS

WITH MORSE TAPER SHANKS.



It is considered advisable to use two drills when large holes are to be made in solid stock, first using a two-groove drill and following with a three or four-groove drill.

A two-groove drill should not be used in cored holes or to follow another drill.

The points of the three and four-groove drills show that they are not to be used for drilling solid stock but for enlarging a hole already made.

Diameter, Inches.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.	Morse Taper Shank.
$\frac{1}{4}$	\$1.50	$6\frac{1}{8}$	$2\frac{1}{16}$	} No. 1.
$\frac{17}{64}$	1.60	$6\frac{1}{4}$	$2\frac{1}{16}$	
$\frac{9}{32}$	1.60	$6\frac{1}{4}$	$2\frac{1}{16}$	
$\frac{19}{64}$	1.60	$6\frac{3}{8}$	$3\frac{1}{16}$	
$\frac{5}{16}$	1.60	$6\frac{3}{8}$	$3\frac{1}{16}$	
$\frac{21}{64}$	1.70	$6\frac{1}{2}$	$3\frac{3}{16}$	
$\frac{11}{32}$	1.70	$6\frac{1}{2}$	$3\frac{3}{16}$	
$\frac{23}{64}$	1.70	$6\frac{3}{4}$	$3\frac{7}{16}$	
$\frac{3}{8}$	1.70	$6\frac{3}{4}$	$3\frac{7}{16}$	
$\frac{25}{64}$	1.75	7	$3\frac{11}{16}$	
$\frac{13}{32}$	1.75	7	$3\frac{11}{16}$	
$\frac{27}{64}$	1.80	$7\frac{1}{4}$	$3\frac{15}{16}$	
$\frac{7}{16}$	1.80	$7\frac{1}{4}$	$3\frac{15}{16}$	
$\frac{29}{64}$	1.85	$7\frac{1}{2}$	$4\frac{3}{16}$	
$\frac{15}{32}$	1.85	$7\frac{1}{2}$	$4\frac{3}{16}$	
$\frac{31}{64}$	1.90	$7\frac{3}{4}$	$4\frac{7}{16}$	
$\frac{1}{2}$	1.90	$7\frac{3}{4}$	$4\frac{7}{16}$	
$\frac{33}{64}$	1.95	8	$4\frac{11}{16}$	
$\frac{17}{32}$	1.95	8	$4\frac{11}{16}$	
$\frac{35}{64}$	2.00	$8\frac{1}{4}$	$4\frac{15}{16}$	
$\frac{9}{16}$	2.00	$8\frac{1}{4}$	$4\frac{15}{16}$	

These drills  $\frac{3}{16}$  and smaller have regular drill points.

## No. 102 F.

## THREE-GROOVE DRILLS

WITH MORSE TAPER SHANKS.



Diameter, Inches.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.	Morse Taper Shank.
$\frac{37}{64}$	\$2.30	$8\frac{1}{2}$	$4\frac{5}{8}$	No. 2.
$\frac{19}{32}$	2.30	$8\frac{1}{2}$	$4\frac{5}{8}$	
$\frac{39}{64}$	2.60	$8\frac{3}{4}$	$4\frac{7}{8}$	
$\frac{5}{8}$	2.60	$8\frac{3}{4}$	$4\frac{7}{8}$	
$\frac{41}{64}$	2.70	9	$5\frac{1}{8}$	
$\frac{21}{32}$	2.70	9	$5\frac{1}{8}$	
$\frac{43}{64}$	2.75	$9\frac{1}{4}$	$5\frac{3}{8}$	
$\frac{11}{16}$	2.75	$9\frac{1}{4}$	$5\frac{3}{8}$	
$\frac{45}{64}$	2.85	$9\frac{1}{2}$	$5\frac{5}{8}$	
$\frac{23}{32}$	2.85	$9\frac{1}{2}$	$5\frac{5}{8}$	
$\frac{47}{64}$	2.90	$9\frac{3}{4}$	$5\frac{7}{8}$	
$\frac{3}{4}$	2.90	$9\frac{3}{4}$	$5\frac{7}{8}$	
$\frac{49}{64}$	3.00	$9\frac{7}{8}$	6	
$\frac{25}{32}$	3.00	$9\frac{7}{8}$	6	
$\frac{51}{64}$	3.05	10	$6\frac{1}{8}$	
$\frac{13}{16}$	3.05	10	$6\frac{1}{8}$	
$\frac{53}{64}$	3.15	$10\frac{1}{4}$	$6\frac{3}{8}$	
$\frac{27}{32}$	3.15	$10\frac{1}{4}$	$6\frac{3}{8}$	
$\frac{55}{64}$	3.20	$10\frac{1}{2}$	$6\frac{5}{8}$	
$\frac{7}{8}$	3.20	$10\frac{1}{2}$	$6\frac{5}{8}$	
$\frac{57}{64}$	3.30	$10\frac{5}{8}$	$6\frac{3}{4}$	No. 3.
$\frac{29}{32}$	3.30	$10\frac{5}{8}$	$6\frac{3}{4}$	
$\frac{59}{64}$	3.40	$10\frac{3}{4}$	$6\frac{1}{8}$	
$\frac{15}{16}$	3.40	$10\frac{3}{4}$	$6\frac{1}{8}$	
$\frac{61}{64}$	3.50	$10\frac{7}{8}$	$6\frac{1}{4}$	
$\frac{31}{32}$	3.50	$10\frac{7}{8}$	$6\frac{1}{4}$	
$\frac{63}{64}$	3.60	11	$6\frac{3}{8}$	
1	3.60	11	$6\frac{3}{8}$	

**No. 102 F.**  
**THREE-GROOVE DRILLS**  
 WITH MORSE TAPER SHANKS.



Diameter, Inches.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.	Morse Taper Shank.
1 $\frac{1}{8}$	\$ 3.70	11 $\frac{1}{8}$	6 $\frac{1}{2}$	No. 3.
1 $\frac{3}{8}$	3.70	11 $\frac{1}{8}$	6 $\frac{1}{2}$	
1 $\frac{3}{4}$	3.80	11 $\frac{1}{4}$	6 $\frac{5}{8}$	
1 $\frac{7}{8}$	3.80	11 $\frac{1}{4}$	6 $\frac{5}{8}$	
1 $\frac{5}{8}$	3.90	11 $\frac{1}{2}$	6 $\frac{7}{8}$	
1 $\frac{3}{2}$	3.90	11 $\frac{1}{2}$	6 $\frac{7}{8}$	
1 $\frac{7}{4}$	4.00	11 $\frac{3}{4}$	7 $\frac{1}{8}$	
1 $\frac{1}{8}$	4.00	11 $\frac{3}{4}$	7 $\frac{1}{8}$	
1 $\frac{3}{4}$	4.25	11 $\frac{7}{8}$	7 $\frac{1}{4}$	
1 $\frac{5}{2}$	4.25	11 $\frac{7}{8}$	7 $\frac{1}{4}$	
1 $\frac{1}{2}$	4.50	12	7 $\frac{3}{8}$	
1 $\frac{3}{4}$	4.50	12	7 $\frac{3}{8}$	
1 $\frac{1}{4}$	4.65	12 $\frac{1}{8}$	7 $\frac{1}{2}$	
1 $\frac{7}{2}$	4.65	12 $\frac{1}{8}$	7 $\frac{1}{2}$	
1 $\frac{1}{2}$	4.80	12 $\frac{1}{2}$	7 $\frac{7}{8}$	
1 $\frac{1}{4}$	4.80	12 $\frac{1}{2}$	7 $\frac{7}{8}$	No. 4.
1 $\frac{1}{2}$	5.00	14 $\frac{1}{8}$	8 $\frac{1}{2}$	
1 $\frac{3}{2}$	5.00	14 $\frac{1}{8}$	8 $\frac{1}{2}$	
1 $\frac{1}{2}$	5.20	14 $\frac{1}{4}$	8 $\frac{5}{8}$	
1 $\frac{5}{8}$	5.20	14 $\frac{1}{4}$	8 $\frac{5}{8}$	
1 $\frac{1}{2}$	5.40	14 $\frac{3}{8}$	8 $\frac{3}{4}$	
1 $\frac{1}{2}$	5.40	14 $\frac{3}{8}$	8 $\frac{3}{4}$	
1 $\frac{1}{2}$	5.60	14 $\frac{1}{2}$	8 $\frac{7}{8}$	
1 $\frac{3}{8}$	5.60	14 $\frac{1}{2}$	8 $\frac{7}{8}$	
1 $\frac{1}{2}$	5.80	14 $\frac{5}{8}$	9	
1 $\frac{1}{2}$	5.80	14 $\frac{5}{8}$	9	



## No. 102 F.

## THREE-GROOVE DRILLS

WITH MORSE TAPER SHANKS.



Diameter, Inches.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.	Morse Taper Shank.
$1\frac{1}{16}$	\$6.00	$14\frac{3}{4}$	$9\frac{1}{8}$	No. 4.
$1\frac{1}{8}$	6.00	$14\frac{3}{4}$	$9\frac{1}{8}$	
$1\frac{3}{16}$	6.20	$14\frac{7}{8}$	$9\frac{1}{4}$	
$1\frac{1}{2}$	6.20	$14\frac{7}{8}$	$9\frac{1}{4}$	
$1\frac{3}{4}$	6.40	15	$9\frac{3}{8}$	
$1\frac{1}{2}$	6.40	15	$9\frac{3}{8}$	
* $1\frac{1}{2}$	6.65	15	$9\frac{3}{8}$	
$1\frac{5}{8}$	6.90	$15\frac{1}{4}$	$9\frac{5}{8}$	
$1\frac{3}{4}$	7.15	$15\frac{1}{4}$	$9\frac{5}{8}$	
$1\frac{5}{8}$	7.40	$15\frac{1}{2}$	$9\frac{7}{8}$	
$1\frac{3}{4}$	7.65	$15\frac{1}{2}$	$9\frac{7}{8}$	
$1\frac{1}{2}$	7.90	$15\frac{3}{4}$	$10\frac{1}{8}$	
$1\frac{3}{4}$	8.15	$15\frac{3}{4}$	$9\frac{1}{4}$	
$1\frac{3}{4}$	8.40	16	$9\frac{1}{4}$	
$1\frac{3}{4}$	8.60	16	$9\frac{1}{4}$	
$1\frac{1}{2}$	8.80	$16\frac{1}{4}$	$10\frac{1}{8}$	
$1\frac{3}{4}$	9.00	$16\frac{1}{4}$	$10\frac{1}{8}$	
$1\frac{1}{2}$	9.20	$16\frac{1}{2}$	$10\frac{3}{8}$	
$1\frac{3}{4}$	9.35	$16\frac{1}{2}$	$10\frac{3}{8}$	
$1\frac{1}{2}$	9.50	$16\frac{1}{2}$	$10\frac{1}{4}$	
$1\frac{3}{4}$	9.65	$16\frac{1}{2}$	$10\frac{1}{4}$	
2	9.80	$16\frac{1}{2}$	$10\frac{1}{4}$	
$2\frac{1}{32}$	10.20	$16\frac{1}{2}$	$9\frac{1}{2}$	No. 5.
$2\frac{1}{16}$	10.60	17	10	
$2\frac{3}{32}$	10.90	17	10	

\*Drills  $1\frac{1}{16}$  inches and larger take a different discount than  $1\frac{1}{2}$  inches and smaller.

Drills larger than  $1\frac{1}{2}$  inches are furnished in 64th sizes if ordered and take price of the next larger size listed.

**No. 102 F.**  
**THREE-GROOVE DRILLS**  
 WITH MORSE TAPER SHANKS.



Diameter, Inches.	Price Each.	Whole Leng.h, Inches.	Twist Cut, Inches.	Morse Taper Shank.
2 1/8	\$11.20	17	10	} No. 5.
2 5/32	11.60	17	10	
2 3/16	12.00	17	10	
2 7/32	12.40	17 1/2	10 1/2	
2 1/4	12.80	17 1/2	10 3/8	
2 9/32	13.20	17 1/2	10 1/8	
2 5/16	13.60	17 1/2	10 1/8	
2 11/32	14.00	18	10 5/8	
2 3/8	14.40	18	10 1/2	
2 13/32	14.70	18 1/2	11	
2 7/16	15.00	18 1/2	11	
2 15/32	15.30	19	11 1/2	
2 1/2	15.60	19	11 3/8	
2 17/32	15.90	19 1/4	11 5/8	
2 9/16	16.20	19 1/4	11 5/8	
2 19/32	16.50	19 1/2	11 7/8	
2 5/8	16.80	19 1/2	11 3/4	
2 21/32	17.35	20	12 1/4	
2 11/16	17.90	20	12 1/4	
2 23/32	18.45	20 1/2	12 3/4	
2 3/4	19.00	20 1/2	12 5/8	
2 25/32	19.50	20 1/2	12 5/8	
2 13/16	20.00	20 1/2	12 5/8	
2 27/32	20.50	21	13 1/8	
2 7/8	21.00	21	13	
2 29/32	22.00	21	13	
2 15/16	23.00	21	13	
2 31/32	24.00	22	14	
3	25.00	22	13 7/8	

Drills 1 1/4 inches and larger take a different discount than 1 1/2 inches and smaller.

Drills larger than 1 1/2 inches are finished in 64th sizes if ordered and take price of the next larger size listed.

For No. 102G see pages 104-107.

## No. 104G.

## THREE-GROOVE DRILLS

WITH STRAIGHT SHANKS.



It is considered advisable to use two drills when large holes are to be made in solid stock first using a two-groove drill and following with a three or four-groove drill.

A two-groove drill should not be used in cored holes or to follow another drill.

The points of the three and four-groove drills show that they are not to be used for drilling solid stock but for enlarging a hole already made.

Diameter, Inches.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.	Diameter Shank, Inches.	Length Shank, Inches.
$\frac{1}{4}$	\$1.30	$6\frac{1}{8}$	$3\frac{7}{8}$	$\frac{1}{4}$	$1\frac{1}{2}$
$\frac{17}{64}$	1.40	$6\frac{1}{4}$	4	$\frac{1}{4}$	$1\frac{1}{2}$
$\frac{9}{32}$	1.40	$6\frac{1}{4}$	4	$\frac{1}{4}$	$1\frac{1}{2}$
$\frac{19}{64}$	1.50	$6\frac{3}{8}$	$4\frac{1}{8}$	$\frac{1}{4}$	$1\frac{1}{2}$
$\frac{5}{16}$	1.50	$6\frac{3}{8}$	$4\frac{1}{8}$	$\frac{1}{4}$	$1\frac{1}{2}$
$\frac{21}{64}$	1.60	$6\frac{1}{2}$	$4\frac{1}{4}$	$\frac{1}{4}$	$1\frac{1}{2}$
$\frac{11}{32}$	1.60	$6\frac{1}{2}$	$4\frac{1}{4}$	$\frac{1}{4}$	$1\frac{1}{2}$
$\frac{23}{64}$	1.70	$6\frac{3}{4}$	$4\frac{1}{4}$	$\frac{3}{8}$	$1\frac{3}{4}$
$\frac{3}{8}$	1.70	$6\frac{3}{4}$	$4\frac{1}{4}$	$\frac{3}{8}$	$1\frac{3}{4}$
$\frac{25}{64}$	1.75	7	$4\frac{1}{2}$	$\frac{3}{8}$	$1\frac{3}{4}$
$\frac{13}{32}$	1.75	7	$4\frac{1}{2}$	$\frac{3}{8}$	$1\frac{3}{4}$
$\frac{27}{64}$	1.80	$7\frac{1}{4}$	$4\frac{3}{4}$	$\frac{3}{8}$	$1\frac{3}{4}$
$\frac{7}{16}$	1.80	$7\frac{1}{4}$	$4\frac{3}{4}$	$\frac{3}{8}$	$1\frac{3}{4}$
$\frac{29}{64}$	1.85	$7\frac{1}{2}$	5	$\frac{3}{8}$	$1\frac{3}{4}$
$\frac{15}{32}$	1.85	$7\frac{1}{2}$	5	$\frac{3}{8}$	$1\frac{3}{4}$
$\frac{31}{64}$	1.90	$7\frac{3}{4}$	5	$\frac{1}{2}$	2
$\frac{1}{2}$	1.90	$7\frac{3}{4}$	5	$\frac{1}{2}$	2
$\frac{33}{64}$	1.95	8	$5\frac{1}{4}$	$\frac{1}{2}$	2
$\frac{17}{32}$	1.95	8	$5\frac{1}{4}$	$\frac{1}{2}$	2
$\frac{35}{64}$	2.00	$8\frac{1}{4}$	$5\frac{1}{2}$	$\frac{1}{2}$	2
$\frac{9}{16}$	2.00	$8\frac{1}{4}$	$5\frac{1}{2}$	$\frac{1}{2}$	2
$\frac{37}{64}$	2.30	$8\frac{1}{2}$	$5\frac{3}{4}$	$\frac{1}{2}$	2
$\frac{19}{32}$	2.30	$8\frac{1}{2}$	$5\frac{3}{4}$	$\frac{1}{2}$	2

These drills  $\frac{3}{32}$  and smaller have regular drill points.

## No. 104 G.

## THREE-GROOVE DRILLS

WITH STRAIGHT SHANKS.



Diameter, Inches.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.	Diameter Shank, Inches.	Length Shank, Inches.
$\frac{3}{16}$	\$2.60	$8\frac{3}{4}$	$5\frac{3}{4}$	$\frac{5}{8}$	$2\frac{1}{4}$
$\frac{5}{8}$	2.60	$8\frac{3}{4}$	$5\frac{3}{4}$	$\frac{5}{8}$	$2\frac{1}{4}$
$\frac{1}{4}$	2.70	9	6	$\frac{5}{8}$	$2\frac{1}{4}$
$\frac{3}{16}$	2.70	9	6	$\frac{5}{8}$	$2\frac{1}{4}$
$\frac{1}{2}$	2.75	$9\frac{1}{4}$	$6\frac{1}{4}$	$\frac{5}{8}$	$2\frac{1}{4}$
$\frac{1}{8}$	2.75	$9\frac{1}{4}$	$6\frac{1}{4}$	$\frac{5}{8}$	$2\frac{1}{4}$
$\frac{3}{8}$	2.85	$9\frac{1}{2}$	$6\frac{1}{2}$	$\frac{5}{8}$	$2\frac{1}{4}$
$\frac{1}{2}$	2.85	$9\frac{1}{2}$	$6\frac{1}{2}$	$\frac{5}{8}$	$2\frac{1}{4}$
$\frac{3}{4}$	2.90	$9\frac{3}{4}$	$6\frac{3}{4}$	$\frac{3}{4}$	$2\frac{1}{4}$
$\frac{1}{2}$	2.90	$9\frac{3}{4}$	$6\frac{3}{4}$	$\frac{3}{4}$	$2\frac{1}{4}$
$\frac{5}{8}$	3.00	$9\frac{7}{8}$	$6\frac{7}{8}$	$\frac{3}{4}$	$2\frac{1}{4}$
$\frac{3}{4}$	3.00	$9\frac{7}{8}$	$6\frac{7}{8}$	$\frac{3}{4}$	$2\frac{1}{4}$
$\frac{7}{8}$	3.05	10	7	$\frac{3}{4}$	$2\frac{1}{4}$
$\frac{1}{2}$	3.05	10	7	$\frac{3}{4}$	$2\frac{1}{4}$
$\frac{1}{4}$	3.15	$10\frac{1}{4}$	$7\frac{1}{4}$	$\frac{3}{4}$	$2\frac{1}{4}$
$\frac{3}{8}$	3.15	$10\frac{1}{4}$	$7\frac{1}{4}$	$\frac{3}{4}$	$2\frac{1}{4}$
$\frac{1}{2}$	3.20	$10\frac{1}{2}$	$7\frac{1}{4}$	$\frac{7}{8}$	$2\frac{1}{2}$
$\frac{3}{4}$	3.20	$10\frac{1}{2}$	$7\frac{1}{4}$	$\frac{7}{8}$	$2\frac{1}{2}$
$\frac{1}{2}$	3.30	$10\frac{5}{8}$	$7\frac{3}{8}$	$\frac{7}{8}$	$2\frac{1}{2}$
$\frac{3}{8}$	3.30	$10\frac{5}{8}$	$7\frac{3}{8}$	$\frac{7}{8}$	$2\frac{1}{2}$
$\frac{1}{4}$	3.40	$10\frac{3}{4}$	$7\frac{1}{2}$	$\frac{7}{8}$	$2\frac{1}{2}$
$\frac{1}{8}$	3.40	$10\frac{3}{4}$	$7\frac{1}{2}$	$\frac{7}{8}$	$2\frac{1}{2}$
$\frac{1}{4}$	3.50	$10\frac{7}{8}$	$7\frac{5}{8}$	$\frac{7}{8}$	$2\frac{1}{2}$
$\frac{3}{8}$	3.50	$10\frac{7}{8}$	$7\frac{5}{8}$	$\frac{7}{8}$	$2\frac{1}{2}$
$\frac{1}{2}$	3.60	11	$7\frac{1}{2}$	1	$2\frac{3}{4}$
1	3.60	11	$7\frac{1}{2}$	1	$2\frac{3}{4}$

## No. 104G.

## THREE-GROOVE DRILLS

WITH STRAIGHT SHANKS.



Diameter, Inches.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.	Diameter Shank, Inches.	Length Shank, Inches.
$1\frac{1}{8}$	\$3.70	$11\frac{1}{8}$	$7\frac{5}{8}$	1	$2\frac{3}{4}$
$1\frac{1}{32}$	3.70	$11\frac{1}{8}$	$7\frac{5}{8}$	1	$2\frac{3}{4}$
$1\frac{3}{64}$	3.80	$11\frac{1}{4}$	$7\frac{3}{4}$	1	$2\frac{3}{4}$
$1\frac{1}{16}$	3.80	$11\frac{1}{4}$	$7\frac{3}{4}$	1	$2\frac{3}{4}$
$1\frac{5}{64}$	3.90	$11\frac{1}{2}$	8	1	$2\frac{3}{4}$
$1\frac{3}{32}$	3.90	$11\frac{1}{2}$	8	1	$2\frac{3}{4}$
$1\frac{7}{64}$	4.00	$11\frac{3}{4}$	$8\frac{1}{4}$	1	$2\frac{3}{4}$
$1\frac{1}{8}$	4.00	$11\frac{3}{4}$	$8\frac{1}{4}$	1	$2\frac{3}{4}$
$1\frac{9}{64}$	4.25	$11\frac{7}{8}$	$8\frac{3}{8}$	1	$2\frac{3}{4}$
$1\frac{5}{32}$	4.25	$11\frac{7}{8}$	$8\frac{3}{8}$	1	$2\frac{3}{4}$
$1\frac{11}{64}$	4.50	12	$8\frac{1}{2}$	1	$2\frac{3}{4}$
$1\frac{3}{16}$	4.50	12	$8\frac{1}{2}$	1	$2\frac{3}{4}$
$1\frac{13}{64}$	4.65	$12\frac{1}{8}$	$8\frac{5}{8}$	1	$2\frac{3}{4}$
$1\frac{7}{32}$	4.65	$12\frac{1}{8}$	$8\frac{5}{8}$	1	$2\frac{3}{4}$
$1\frac{15}{64}$	4.80	$12\frac{1}{2}$	$8\frac{3}{4}$	$1\frac{1}{4}$	3
$1\frac{1}{4}$	4.80	$12\frac{1}{2}$	$8\frac{3}{4}$	$1\frac{1}{4}$	3
$1\frac{17}{64}$	5.00	$14\frac{1}{8}$	$10\frac{3}{8}$	$1\frac{1}{4}$	3
$1\frac{9}{32}$	5.00	$14\frac{1}{8}$	$10\frac{3}{8}$	$1\frac{1}{4}$	3
$1\frac{19}{64}$	5.20	$14\frac{1}{4}$	$10\frac{1}{2}$	$1\frac{1}{4}$	3
$1\frac{5}{16}$	5.20	$14\frac{1}{4}$	$10\frac{1}{2}$	$1\frac{1}{4}$	3
$1\frac{21}{64}$	5.40	$14\frac{3}{8}$	$10\frac{5}{8}$	$1\frac{1}{4}$	3
$1\frac{11}{32}$	5.40	$14\frac{3}{8}$	$10\frac{5}{8}$	$1\frac{1}{4}$	3
$1\frac{23}{64}$	5.60	$14\frac{1}{2}$	$10\frac{3}{4}$	$1\frac{1}{4}$	3
$1\frac{3}{8}$	5.60	$14\frac{1}{2}$	$10\frac{3}{4}$	$1\frac{1}{4}$	3
$1\frac{25}{64}$	5.80	$14\frac{5}{8}$	$10\frac{7}{8}$	$1\frac{1}{4}$	3
$1\frac{13}{32}$	5.80	$14\frac{5}{8}$	$10\frac{7}{8}$	$1\frac{1}{4}$	3
$1\frac{27}{64}$	6.00	$14\frac{3}{4}$	11	$1\frac{1}{4}$	3

## No. 104 G.

## THREE-GROOVE DRILLS

WITH STRAIGHT SHANKS.



Diameter, Inches.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.	Diameter Shank, Inches.	Length Shank, Inches.
1 <sup>7</sup> / <sub>16</sub>	\$6.00	14 <sup>3</sup> / <sub>4</sub>	11	1 <sup>1</sup> / <sub>4</sub>	3
1 <sup>1</sup> / <sub>2</sub>	6.20	14 <sup>7</sup> / <sub>8</sub>	11 <sup>1</sup> / <sub>8</sub>	1 <sup>1</sup> / <sub>4</sub>	3
1 <sup>5</sup> / <sub>8</sub>	6.20	14 <sup>7</sup> / <sub>8</sub>	11 <sup>1</sup> / <sub>8</sub>	1 <sup>1</sup> / <sub>4</sub>	3
1 <sup>3</sup> / <sub>4</sub>	6.40	15	11 <sup>1</sup> / <sub>4</sub>	1 <sup>1</sup> / <sub>4</sub>	3
1 <sup>1</sup> / <sub>2</sub>	6.40	15	11 <sup>1</sup> / <sub>4</sub>	1 <sup>1</sup> / <sub>4</sub>	3
*1 <sup>7</sup> / <sub>16</sub>	6.65	15	11 <sup>1</sup> / <sub>4</sub>	1 <sup>1</sup> / <sub>4</sub>	3
1 <sup>9</sup> / <sub>16</sub>	6.90	15 <sup>1</sup> / <sub>4</sub>	11 <sup>1</sup> / <sub>2</sub>	1 <sup>1</sup> / <sub>4</sub>	3
1 <sup>5</sup> / <sub>8</sub>	7.15	15 <sup>1</sup> / <sub>4</sub>	11 <sup>1</sup> / <sub>2</sub>	1 <sup>1</sup> / <sub>4</sub>	3
1 <sup>3</sup> / <sub>4</sub>	7.40	15 <sup>1</sup> / <sub>2</sub>	11 <sup>3</sup> / <sub>4</sub>	1 <sup>1</sup> / <sub>4</sub>	3
1 <sup>7</sup> / <sub>8</sub>	7.65	15 <sup>1</sup> / <sub>2</sub>	11 <sup>3</sup> / <sub>4</sub>	1 <sup>1</sup> / <sub>4</sub>	3
1 <sup>1</sup> / <sub>2</sub>	7.90	15 <sup>3</sup> / <sub>4</sub>	12	1 <sup>1</sup> / <sub>4</sub>	3
1 <sup>5</sup> / <sub>8</sub>	8.15	15 <sup>3</sup> / <sub>4</sub>	12	1 <sup>1</sup> / <sub>4</sub>	3
1 <sup>3</sup> / <sub>4</sub>	8.40	16	11 <sup>7</sup> / <sub>8</sub>	1 <sup>1</sup> / <sub>4</sub>	3
1 <sup>5</sup> / <sub>8</sub>	8.60	16	11 <sup>7</sup> / <sub>8</sub>	1 <sup>1</sup> / <sub>4</sub>	3
1 <sup>1</sup> / <sub>2</sub>	8.80	16 <sup>1</sup> / <sub>4</sub>	12 <sup>1</sup> / <sub>8</sub>	1 <sup>1</sup> / <sub>4</sub>	3
1 <sup>3</sup> / <sub>4</sub>	9.00	16 <sup>1</sup> / <sub>4</sub>	12 <sup>1</sup> / <sub>8</sub>	1 <sup>1</sup> / <sub>4</sub>	3
1 <sup>7</sup> / <sub>8</sub>	9.20	16 <sup>1</sup> / <sub>2</sub>	12 <sup>1</sup> / <sub>4</sub>	1 <sup>1</sup> / <sub>4</sub>	3
1 <sup>5</sup> / <sub>8</sub>	9.35	16 <sup>1</sup> / <sub>2</sub>	12 <sup>1</sup> / <sub>4</sub>	1 <sup>1</sup> / <sub>4</sub>	3
1 <sup>1</sup> / <sub>2</sub>	9.50	16 <sup>1</sup> / <sub>2</sub>	12 <sup>1</sup> / <sub>4</sub>	1 <sup>1</sup> / <sub>4</sub>	3
1 <sup>3</sup> / <sub>4</sub>	9.65	16 <sup>1</sup> / <sub>2</sub>	12 <sup>1</sup> / <sub>4</sub>	1 <sup>1</sup> / <sub>4</sub>	3
2	9.80	16 <sup>1</sup> / <sub>2</sub>	12 <sup>1</sup> / <sub>8</sub>	1 <sup>1</sup> / <sub>4</sub>	3
2 <sup>1</sup> / <sub>32</sub>	10.20	16 <sup>1</sup> / <sub>2</sub>	11 <sup>3</sup> / <sub>4</sub>	1 <sup>1</sup> / <sub>2</sub>	3 <sup>1</sup> / <sub>2</sub>
2 <sup>1</sup> / <sub>16</sub>	10.60	17	12 <sup>1</sup> / <sub>4</sub>	1 <sup>1</sup> / <sub>2</sub>	3 <sup>1</sup> / <sub>2</sub>
2 <sup>3</sup> / <sub>32</sub>	10.90	17	12 <sup>1</sup> / <sub>4</sub>	1 <sup>1</sup> / <sub>2</sub>	3 <sup>1</sup> / <sub>2</sub>
2 <sup>1</sup> / <sub>8</sub>	11.20	17	12 <sup>1</sup> / <sub>8</sub>	1 <sup>1</sup> / <sub>2</sub>	3 <sup>1</sup> / <sub>2</sub>
2 <sup>5</sup> / <sub>32</sub>	11.60	17	12 <sup>1</sup> / <sub>8</sub>	1 <sup>1</sup> / <sub>2</sub>	3 <sup>1</sup> / <sub>2</sub>
2 <sup>3</sup> / <sub>16</sub>	12.00	17	12 <sup>1</sup> / <sub>8</sub>	1 <sup>1</sup> / <sub>2</sub>	3 <sup>1</sup> / <sub>2</sub>

\*Drills 1 <sup>1</sup>/<sub>2</sub> inches and larger take a different discount than 1 <sup>1</sup>/<sub>4</sub> inches and smaller.Drills larger than 1 <sup>1</sup>/<sub>4</sub> inches are furnished in 64th sizes if ordered and take price of the next larger size listed.

## No. 104G.

## THREE-GROOVE DRILLS

WITH STRAIGHT SHANKS.



Diameter, Inches.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.	Diameter Shank, Inches.	Length Shank, Inches.
2 $\frac{7}{32}$	\$12.40	17 $\frac{1}{2}$	12 $\frac{5}{8}$	1 $\frac{1}{2}$	3 $\frac{1}{2}$
2 $\frac{1}{4}$	12.80	17 $\frac{1}{2}$	12 $\frac{1}{2}$	1 $\frac{1}{2}$	3 $\frac{1}{2}$
2 $\frac{9}{32}$	13.20	17 $\frac{1}{2}$	12 $\frac{1}{2}$	1 $\frac{1}{2}$	3 $\frac{1}{2}$
2 $\frac{5}{16}$	13.60	17 $\frac{1}{2}$	12 $\frac{1}{2}$	1 $\frac{1}{2}$	3 $\frac{1}{2}$
2 $\frac{11}{32}$	14.00	18	13	1 $\frac{1}{2}$	3 $\frac{1}{2}$
2 $\frac{3}{8}$	14.40	18	12 $\frac{7}{8}$	1 $\frac{1}{2}$	3 $\frac{1}{2}$
2 $\frac{13}{32}$	14.70	18 $\frac{1}{2}$	13 $\frac{3}{8}$	1 $\frac{1}{2}$	3 $\frac{1}{2}$
2 $\frac{7}{16}$	15.00	18 $\frac{1}{2}$	13 $\frac{3}{8}$	1 $\frac{1}{2}$	3 $\frac{1}{2}$
2 $\frac{15}{32}$	15.30	19	13 $\frac{7}{8}$	1 $\frac{1}{2}$	3 $\frac{1}{2}$
2 $\frac{1}{2}$	15.60	19	13 $\frac{3}{4}$	1 $\frac{1}{2}$	3 $\frac{1}{2}$
2 $\frac{17}{32}$	15.90	19 $\frac{1}{4}$	14	1 $\frac{1}{2}$	3 $\frac{1}{2}$
2 $\frac{9}{16}$	16.20	19 $\frac{1}{4}$	14	1 $\frac{1}{2}$	3 $\frac{1}{2}$
2 $\frac{19}{32}$	16.50	19 $\frac{1}{2}$	14 $\frac{1}{4}$	1 $\frac{1}{2}$	3 $\frac{1}{2}$
2 $\frac{5}{8}$	16.80	19 $\frac{1}{2}$	14 $\frac{1}{8}$	1 $\frac{1}{2}$	3 $\frac{1}{2}$
2 $\frac{21}{32}$	17.35	20	14 $\frac{5}{8}$	1 $\frac{1}{2}$	3 $\frac{1}{2}$
2 $\frac{11}{16}$	17.90	20	14 $\frac{5}{8}$	1 $\frac{1}{2}$	3 $\frac{1}{2}$
2 $\frac{23}{32}$	18.45	20 $\frac{1}{2}$	15 $\frac{1}{8}$	1 $\frac{1}{2}$	3 $\frac{1}{2}$
2 $\frac{3}{4}$	19.00	20 $\frac{1}{2}$	15	1 $\frac{1}{2}$	3 $\frac{1}{2}$
2 $\frac{25}{32}$	19.50	20 $\frac{1}{2}$	14 $\frac{1}{2}$	1 $\frac{3}{4}$	4
2 $\frac{13}{16}$	20.00	20 $\frac{1}{2}$	14 $\frac{1}{2}$	1 $\frac{3}{4}$	4
2 $\frac{27}{32}$	20.50	21	15	1 $\frac{3}{4}$	4
2 $\frac{7}{8}$	21.00	21	14 $\frac{7}{8}$	1 $\frac{3}{4}$	4
2 $\frac{29}{32}$	22.00	21	14 $\frac{7}{8}$	1 $\frac{3}{4}$	4
2 $\frac{15}{16}$	23.00	21	14 $\frac{7}{8}$	1 $\frac{3}{4}$	4
2 $\frac{31}{32}$	24.00	22	15 $\frac{7}{8}$	1 $\frac{3}{4}$	4
3	25.00	22	15 $\frac{3}{4}$	1 $\frac{3}{4}$	4

Drills 1  $\frac{1}{4}$  inches and larger take a different discount than 1  $\frac{1}{2}$  inches and smaller.Drills larger than 1  $\frac{1}{2}$  inches are furnished in 64th sizes if ordered and take price of the next larger size listed.

For No. 104 H see pages 108-111

**No. 102 G.**  
**FOUR-GROOVE DRILLS**  
**WITH MORSE TAPER SHANKS.**



It is considered advisable to use two drills when large holes are to be made in solid stock, first using a two-groove drill and following with a three or four-groove drill.

A two-groove drill should not be used in cored holes or to follow another drill.

The points of the three and four-groove drills show that they are not to be used for drilling solid stock but for enlarging a hole already made.

Diameter, Inches.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.	Morse Taper Shank.
$\frac{1}{2}$	\$1.90	$7\frac{3}{4}$	$4\frac{7}{8}$	No. 1.
$\frac{3}{8}$	1.95	8	$4\frac{11}{16}$	
$\frac{1}{2}$	1.95	8	$4\frac{11}{16}$	
$\frac{5}{8}$	2.00	$8\frac{1}{4}$	$4\frac{11}{16}$	
$\frac{3}{4}$	2.00	$8\frac{1}{4}$	$4\frac{11}{16}$	
$\frac{7}{8}$	2.30	$8\frac{1}{2}$	$4\frac{5}{8}$	
$\frac{1}{2}$	2.30	$8\frac{1}{2}$	$4\frac{5}{8}$	No. 2.
$\frac{3}{4}$	2.60	$8\frac{3}{4}$	$4\frac{7}{8}$	
$\frac{5}{8}$	2.60	$8\frac{3}{4}$	$4\frac{7}{8}$	
$\frac{1}{2}$	2.70	9	$5\frac{1}{8}$	
$\frac{3}{4}$	2.70	9	$5\frac{1}{8}$	
$\frac{1}{2}$	2.75	$9\frac{1}{4}$	$5\frac{3}{8}$	
$\frac{3}{4}$	2.75	$9\frac{1}{4}$	$5\frac{3}{8}$	
$\frac{1}{2}$	2.85	$9\frac{1}{2}$	$5\frac{5}{8}$	
$\frac{3}{4}$	2.85	$9\frac{1}{2}$	$5\frac{5}{8}$	
$\frac{1}{2}$	2.90	$9\frac{3}{4}$	$5\frac{7}{8}$	
$\frac{3}{4}$	2.90	$9\frac{3}{4}$	$5\frac{7}{8}$	
$\frac{1}{2}$	3.00	$9\frac{7}{8}$	6	
$\frac{3}{4}$	3.00	$9\frac{7}{8}$	6	
$\frac{1}{2}$	3.05	10	$6\frac{1}{8}$	
$\frac{3}{4}$	3.05	10	$6\frac{1}{8}$	
$\frac{1}{2}$	3.15	$10\frac{1}{4}$	$6\frac{3}{8}$	
$\frac{3}{4}$	3.15	$10\frac{1}{4}$	$6\frac{3}{8}$	
$\frac{1}{2}$	3.20	$10\frac{1}{2}$	$6\frac{5}{8}$	
$\frac{3}{4}$	3.20	$10\frac{1}{2}$	$6\frac{5}{8}$	



**No. 102G.**  
**FOUR-GROOVE DRILLS**  
 WITH MORSE TAPER SHANKS.



Diameter, Inches.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.	Morse Taper Shank.
$\frac{57}{64}$	\$3.30	$10\frac{5}{8}$	$6\frac{3}{4}$	} No. 2.
$\frac{39}{32}$	3.30	$10\frac{5}{8}$	$6\frac{3}{4}$	
$\frac{59}{64}$	3.40	$10\frac{3}{4}$	$6\frac{1}{8}$	} No. 3.
$\frac{15}{16}$	3.40	$10\frac{3}{4}$	$6\frac{1}{8}$	
$\frac{61}{64}$	3.50	$10\frac{7}{8}$	$6\frac{1}{4}$	
$\frac{31}{32}$	3.50	$10\frac{7}{8}$	$6\frac{1}{4}$	
$\frac{63}{64}$	3.60	11	$6\frac{3}{8}$	
1	3.60	11	$6\frac{3}{8}$	
$1\frac{1}{64}$	3.70	$11\frac{1}{8}$	$6\frac{1}{2}$	
$1\frac{1}{32}$	3.70	$11\frac{1}{8}$	$6\frac{1}{2}$	
$1\frac{3}{64}$	3.80	$11\frac{1}{4}$	$6\frac{5}{8}$	
$1\frac{1}{16}$	3.80	$11\frac{1}{4}$	$6\frac{5}{8}$	
$1\frac{5}{64}$	3.90	$11\frac{1}{2}$	$6\frac{7}{8}$	
$1\frac{3}{32}$	3.90	$11\frac{1}{2}$	$6\frac{7}{8}$	
$1\frac{7}{64}$	4.00	$11\frac{3}{4}$	$7\frac{1}{8}$	
$1\frac{1}{8}$	4.00	$11\frac{3}{4}$	$7\frac{1}{8}$	
$1\frac{9}{64}$	4.25	$11\frac{7}{8}$	$7\frac{1}{4}$	
$1\frac{5}{32}$	4.25	$11\frac{7}{8}$	$7\frac{1}{4}$	
$1\frac{11}{64}$	4.50	12	$7\frac{3}{8}$	
$1\frac{3}{16}$	4.50	12	$7\frac{3}{8}$	
$1\frac{13}{64}$	4.65	$12\frac{1}{8}$	$7\frac{1}{2}$	} No. 4.
$1\frac{7}{32}$	4.65	$12\frac{1}{8}$	$7\frac{1}{2}$	
$1\frac{15}{64}$	4.80	$12\frac{1}{2}$	$7\frac{7}{8}$	
$1\frac{1}{4}$	4.80	$12\frac{1}{2}$	$7\frac{7}{8}$	
$1\frac{17}{64}$	5.00	$14\frac{1}{8}$	$8\frac{1}{2}$	
$1\frac{9}{32}$	5.00	$14\frac{1}{8}$	$8\frac{1}{2}$	
$1\frac{19}{64}$	5.20	$14\frac{1}{4}$	$8\frac{5}{8}$	
$1\frac{5}{16}$	5.20	$14\frac{1}{4}$	$8\frac{5}{8}$	
$1\frac{21}{64}$	5.40	$14\frac{3}{8}$	$8\frac{3}{4}$	
$1\frac{11}{32}$	5.40	$14\frac{3}{8}$	$8\frac{3}{4}$	

**No. 102 G.**  
**FOUR-GROOVE DRILLS**  
 WITH MORSE TAPER SHANKS.



Diameter, Inches.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.	Morse Taper Shank.
$1\frac{3}{8}$	\$5.60	$14\frac{1}{2}$	$8\frac{7}{8}$	No. 4.
$1\frac{3}{8}$	5.60	$14\frac{1}{2}$	$8\frac{7}{8}$	
$1\frac{5}{8}$	5.80	$14\frac{5}{8}$	9	
$1\frac{3}{2}$	5.80	$14\frac{5}{8}$	9	
$1\frac{7}{8}$	6.00	$14\frac{3}{4}$	$9\frac{1}{8}$	
$1\frac{7}{8}$	6.00	$14\frac{3}{4}$	$9\frac{1}{8}$	
$1\frac{9}{8}$	6.20	$14\frac{7}{8}$	$9\frac{1}{4}$	
$1\frac{9}{8}$	6.20	$14\frac{7}{8}$	$9\frac{1}{4}$	
$1\frac{11}{8}$	6.40	15	$9\frac{3}{8}$	
$1\frac{1}{2}$	6.40	15	$9\frac{3}{8}$	
* $1\frac{1}{2}$	6.65	15	$9\frac{3}{8}$	
$1\frac{5}{8}$	6.90	$15\frac{1}{4}$	$9\frac{5}{8}$	
$1\frac{5}{8}$	7.15	$15\frac{1}{4}$	$9\frac{5}{8}$	
$1\frac{5}{8}$	7.40	$15\frac{1}{2}$	$9\frac{7}{8}$	
$1\frac{11}{8}$	7.65	$15\frac{1}{2}$	$9\frac{7}{8}$	
$1\frac{11}{8}$	7.90	$15\frac{3}{4}$	$10\frac{1}{8}$	
$1\frac{3}{2}$	8.15	$15\frac{3}{4}$	$9\frac{11}{8}$	
$1\frac{3}{4}$	8.40	16	$9\frac{11}{8}$	
$1\frac{3}{4}$	8.60	16	$9\frac{11}{8}$	
$1\frac{7}{8}$	8.80	$16\frac{1}{4}$	$10\frac{1}{8}$	
$1\frac{7}{8}$	9.00	$16\frac{1}{4}$	$10\frac{1}{8}$	
$1\frac{7}{8}$	9.20	$16\frac{1}{2}$	$10\frac{3}{8}$	
$1\frac{9}{8}$	9.35	$16\frac{1}{2}$	$10\frac{3}{8}$	
$1\frac{15}{8}$	9.50	$16\frac{1}{2}$	$10\frac{1}{4}$	
$1\frac{15}{8}$	9.65	$16\frac{1}{2}$	$10\frac{1}{4}$	
2	9.80	$16\frac{1}{2}$	$10\frac{1}{4}$	
$2\frac{1}{8}$	10.20	$16\frac{1}{2}$	$9\frac{1}{2}$	No. 5.
$2\frac{1}{8}$	10.60	17	10	
$2\frac{3}{8}$	10.90	17	10	
$2\frac{1}{8}$	11.20	17	10	

\*Drills  $1\frac{1}{2}$  inches and larger take a different discount than  $1\frac{1}{2}$  inches and smaller.

Drills larger than  $1\frac{1}{2}$  inches are furnished in 64th sizes if ordered and take price of the next larger size listed.

**No. 102 G.**  
**FOUR-GROOVE DRILLS**  
**WITH MORSE TAPER SHANKS.**



Diameter, Inches.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.	Morse Taper Shank.
$2\frac{5}{32}$	\$11.60	17	10	} No. 5.
$2\frac{3}{16}$	12.00	17	10	
$2\frac{7}{32}$	12.40	$17\frac{1}{2}$	$10\frac{1}{2}$	
$2\frac{1}{4}$	12.80	$17\frac{1}{2}$	$10\frac{1}{8}$	
$2\frac{3}{8}$	13.20	$17\frac{1}{2}$	$10\frac{1}{8}$	
$2\frac{5}{16}$	13.60	$17\frac{1}{2}$	$10\frac{1}{8}$	
$2\frac{1}{2}$	14.00	18	$10\frac{5}{8}$	
$2\frac{3}{8}$	14.40	18	$10\frac{1}{2}$	
$2\frac{1}{2}$	14.70	$18\frac{1}{2}$	11	
$2\frac{7}{16}$	15.00	$18\frac{1}{2}$	11	
$2\frac{1}{2}$	15.30	19	$11\frac{1}{2}$	
$2\frac{1}{2}$	15.60	19	$11\frac{3}{8}$	
$2\frac{1}{2}$	15.90	$19\frac{1}{4}$	$11\frac{5}{8}$	
$2\frac{1}{8}$	16.20	$19\frac{1}{4}$	$11\frac{5}{8}$	
$2\frac{1}{8}$	16.50	$19\frac{1}{2}$	$11\frac{7}{8}$	
$2\frac{5}{8}$	16.80	$19\frac{1}{2}$	$11\frac{3}{4}$	
$2\frac{1}{2}$	17.35	20	$12\frac{1}{4}$	
$2\frac{1}{8}$	17.90	20	$12\frac{1}{4}$	
$2\frac{3}{8}$	18.45	$20\frac{1}{2}$	$12\frac{3}{4}$	
$2\frac{3}{4}$	19.00	$20\frac{1}{2}$	$12\frac{5}{8}$	
$2\frac{3}{8}$	19.50	$20\frac{1}{2}$	$12\frac{5}{8}$	
$2\frac{1}{8}$	20.00	$20\frac{1}{2}$	$12\frac{5}{8}$	
$2\frac{3}{8}$	20.50	21	$13\frac{1}{8}$	
$2\frac{7}{8}$	21.00	21	13	
$2\frac{3}{8}$	22.00	21	13	
$2\frac{1}{8}$	23.00	21	13	
$2\frac{3}{8}$	24.00	22	14	
3	25.00	22	$13\frac{7}{8}$	

Drills  $1\frac{1}{4}$  inches and larger take a different discount than  $1\frac{1}{2}$  inches and smaller.

Drills larger than  $1\frac{1}{2}$  inches are furnished in 6th sizes if ordered and take price of the next larger size listed.

For No. 102 H see pages 112-113

## No. 104H.

## FOUR-GROOVE DRILLS

WITH STRAIGHT SHANKS.



It is considered advisable to use two drills when large holes are to be made in solid stock, first using a two-groove drill and following with a three or four-groove drill.

A two-groove drill should not be used in cored holes or to follow another drill.

The points of the three and four-groove drills show that they are not to be used for drilling solid stock but for enlarging a hole already made.

Diameter, Inches.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.	Diameter Shank, Inches.	Length Shank, Inches.
$\frac{1}{2}$	\$1.90	$7\frac{3}{4}$	5	$\frac{1}{2}$	2
$\frac{3}{8}$	1.95	8	$5\frac{1}{4}$	$\frac{1}{2}$	2
$\frac{17}{32}$	1.95	8	$5\frac{1}{4}$	$\frac{1}{2}$	2
$\frac{35}{64}$	2.00	$8\frac{1}{4}$	$5\frac{1}{2}$	$\frac{1}{2}$	2
$\frac{15}{16}$	2.00	$8\frac{1}{4}$	$5\frac{1}{2}$	$\frac{1}{2}$	2
$\frac{37}{64}$	2.30	$8\frac{1}{2}$	$5\frac{3}{4}$	$\frac{1}{2}$	2
$\frac{19}{32}$	2.30	$8\frac{1}{2}$	$5\frac{3}{4}$	$\frac{1}{2}$	2
$\frac{39}{64}$	2.60	$8\frac{3}{4}$	$5\frac{3}{4}$	$\frac{5}{8}$	$2\frac{1}{4}$
$\frac{5}{8}$	2.60	$8\frac{3}{4}$	$5\frac{3}{4}$	$\frac{5}{8}$	$2\frac{1}{4}$
$\frac{41}{64}$	2.70	9	6	$\frac{5}{8}$	$2\frac{1}{4}$
$\frac{21}{32}$	2.70	9	6	$\frac{5}{8}$	$2\frac{1}{4}$
$\frac{43}{64}$	2.75	$9\frac{1}{4}$	$6\frac{1}{4}$	$\frac{5}{8}$	$2\frac{1}{4}$
$\frac{11}{16}$	2.75	$9\frac{1}{4}$	$6\frac{1}{4}$	$\frac{5}{8}$	$2\frac{1}{4}$
$\frac{45}{64}$	2.85	$9\frac{1}{2}$	$6\frac{1}{2}$	$\frac{5}{8}$	$2\frac{1}{4}$
$\frac{23}{32}$	2.85	$9\frac{1}{2}$	$6\frac{1}{2}$	$\frac{5}{8}$	$2\frac{1}{4}$
$\frac{47}{64}$	2.90	$9\frac{3}{4}$	$6\frac{3}{4}$	$\frac{3}{4}$	$2\frac{1}{4}$
$\frac{3}{4}$	2.90	$9\frac{3}{4}$	$6\frac{3}{4}$	$\frac{3}{4}$	$2\frac{1}{4}$
$\frac{49}{64}$	3.00	$9\frac{7}{8}$	$6\frac{7}{8}$	$\frac{3}{4}$	$2\frac{1}{4}$
$\frac{25}{32}$	3.00	$9\frac{7}{8}$	$6\frac{7}{8}$	$\frac{3}{4}$	$2\frac{1}{4}$
$\frac{51}{64}$	3.05	10	7	$\frac{3}{4}$	$2\frac{1}{4}$
$\frac{13}{16}$	3.05	10	7	$\frac{3}{4}$	$2\frac{1}{4}$
$\frac{53}{64}$	3.15	$10\frac{1}{4}$	$7\frac{1}{4}$	$\frac{3}{4}$	$2\frac{1}{4}$
$\frac{27}{32}$	3.15	$10\frac{1}{4}$	$7\frac{1}{4}$	$\frac{3}{4}$	$2\frac{1}{4}$
$\frac{55}{64}$	3.20	$10\frac{1}{2}$	$7\frac{1}{4}$	$\frac{7}{8}$	$2\frac{1}{2}$
$\frac{7}{8}$	3.20	$10\frac{1}{2}$	$7\frac{1}{4}$	$\frac{7}{8}$	$2\frac{1}{2}$

**No. 104 H.**  
**FOUR-GROOVE DRILLS**  
**WITH STRAIGHT SHANKS.**



Diameter, Inches.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.	Diameter Shank, Inches.	Length Shank, Inches.
$\frac{5}{64}$	\$3.30	$10\frac{5}{8}$	$7\frac{3}{8}$	$\frac{7}{8}$	$2\frac{1}{2}$
$\frac{29}{32}$	3.30	$10\frac{5}{8}$	$7\frac{3}{8}$	$\frac{7}{8}$	$2\frac{1}{2}$
$\frac{59}{64}$	3.40	$10\frac{3}{4}$	$7\frac{1}{2}$	$\frac{7}{8}$	$2\frac{1}{2}$
$\frac{15}{16}$	3.40	$10\frac{3}{4}$	$7\frac{1}{2}$	$\frac{7}{8}$	$2\frac{1}{2}$
$\frac{61}{64}$	3.50	$10\frac{7}{8}$	$7\frac{5}{8}$	$\frac{7}{8}$	$2\frac{1}{2}$
$\frac{31}{32}$	3.50	$10\frac{7}{8}$	$7\frac{5}{8}$	$\frac{7}{8}$	$2\frac{1}{2}$
$\frac{63}{64}$	3.60	11	$7\frac{1}{2}$	1	$2\frac{3}{4}$
1	3.60	11	$7\frac{1}{2}$	1	$2\frac{3}{4}$
$1\frac{1}{64}$	3.70	$11\frac{1}{8}$	$7\frac{5}{8}$	1	$2\frac{3}{4}$
$1\frac{1}{32}$	3.70	$11\frac{1}{8}$	$7\frac{5}{8}$	1	$2\frac{3}{4}$
$1\frac{3}{64}$	3.80	$11\frac{1}{4}$	$7\frac{3}{4}$	1	$2\frac{3}{4}$
$1\frac{1}{16}$	3.80	$11\frac{1}{4}$	$7\frac{3}{4}$	1	$2\frac{3}{4}$
$1\frac{5}{64}$	3.90	$11\frac{1}{2}$	8	1	$2\frac{3}{4}$
$1\frac{3}{32}$	3.90	$11\frac{1}{2}$	8	1	$2\frac{3}{4}$
$1\frac{7}{64}$	4.00	$11\frac{3}{4}$	$8\frac{1}{4}$	1	$2\frac{3}{4}$
$1\frac{1}{8}$	4.00	$11\frac{3}{4}$	$8\frac{1}{4}$	1	$2\frac{3}{4}$
$1\frac{9}{64}$	4.25	$11\frac{7}{8}$	$8\frac{3}{8}$	1	$2\frac{3}{4}$
$1\frac{5}{32}$	4.25	$11\frac{7}{8}$	$8\frac{3}{8}$	1	$2\frac{3}{4}$
$1\frac{11}{64}$	4.50	12	$8\frac{1}{2}$	1	$2\frac{3}{4}$
$1\frac{3}{16}$	4.50	12	$8\frac{1}{2}$	1	$2\frac{3}{4}$
$1\frac{13}{64}$	4.65	$12\frac{1}{8}$	$8\frac{5}{8}$	1	$2\frac{3}{4}$
$1\frac{7}{32}$	4.65	$12\frac{1}{8}$	$8\frac{5}{8}$	1	$2\frac{3}{4}$
$1\frac{15}{64}$	4.80	$12\frac{1}{2}$	$8\frac{3}{4}$	$1\frac{1}{4}$	3
$1\frac{1}{4}$	4.80	$12\frac{1}{2}$	$8\frac{3}{4}$	$1\frac{1}{4}$	3
$1\frac{17}{64}$	5.00	$14\frac{1}{8}$	$10\frac{3}{8}$	$1\frac{1}{4}$	3
$1\frac{9}{32}$	5.00	$14\frac{1}{8}$	$10\frac{3}{8}$	$1\frac{1}{4}$	3
$1\frac{19}{64}$	5.20	$14\frac{1}{4}$	$10\frac{1}{2}$	$1\frac{1}{4}$	3
$1\frac{5}{16}$	5.20	$14\frac{1}{4}$	$10\frac{1}{2}$	$1\frac{1}{4}$	3
$1\frac{21}{64}$	5.40	$14\frac{3}{8}$	$10\frac{5}{8}$	$1\frac{1}{4}$	3
$1\frac{11}{32}$	5.40	$14\frac{3}{8}$	$10\frac{5}{8}$	$1\frac{1}{4}$	3

**No. 104 H.**  
**FOUR-GROOVE DRILLS**  
**WITH STRAIGHT SHANKS.**



Diameter, Inches.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.	Diameter Shank, Inches.	Length Shank, Inches.
$1\frac{3}{64}$	\$5.60	$14\frac{1}{2}$	$10\frac{3}{4}$	$1\frac{1}{4}$	3
$1\frac{3}{8}$	5.60	$14\frac{1}{2}$	$10\frac{3}{4}$	$1\frac{1}{4}$	3
$1\frac{25}{64}$	5.80	$14\frac{5}{8}$	$10\frac{7}{8}$	$1\frac{1}{4}$	3
$1\frac{13}{32}$	5.80	$14\frac{5}{8}$	$10\frac{7}{8}$	$1\frac{1}{4}$	3
$1\frac{27}{64}$	6.00	$14\frac{3}{4}$	11	$1\frac{1}{4}$	3
$1\frac{7}{16}$	6.00	$14\frac{3}{4}$	11	$1\frac{1}{4}$	3
$1\frac{29}{64}$	6.20	$14\frac{7}{8}$	$11\frac{1}{8}$	$1\frac{1}{4}$	3
$1\frac{15}{32}$	6.20	$14\frac{7}{8}$	$11\frac{1}{8}$	$1\frac{1}{4}$	3
$1\frac{31}{64}$	6.40	15	$11\frac{1}{4}$	$1\frac{1}{4}$	3
$1\frac{1}{2}$	6.40	15	$11\frac{1}{4}$	$1\frac{1}{4}$	3
* $1\frac{17}{32}$	6.65	15	$11\frac{1}{4}$	$1\frac{1}{4}$	3
$1\frac{9}{16}$	6.90	$15\frac{1}{4}$	$11\frac{1}{2}$	$1\frac{1}{4}$	3
$1\frac{33}{64}$	7.15	$15\frac{1}{4}$	$11\frac{1}{2}$	$1\frac{1}{4}$	3
$1\frac{5}{8}$	7.40	$15\frac{1}{2}$	$11\frac{3}{4}$	$1\frac{1}{4}$	3
$1\frac{35}{64}$	7.65	$15\frac{1}{2}$	$11\frac{3}{4}$	$1\frac{1}{4}$	3
$1\frac{11}{16}$	7.90	$15\frac{3}{4}$	12	$1\frac{1}{4}$	3
$1\frac{37}{64}$	8.15	$15\frac{3}{4}$	12	$1\frac{1}{4}$	3
$1\frac{3}{4}$	8.40	16	$11\frac{7}{8}$	$1\frac{1}{4}$	3
$1\frac{39}{64}$	8.60	16	$11\frac{7}{8}$	$1\frac{1}{4}$	3
$1\frac{13}{16}$	8.80	$16\frac{1}{4}$	$12\frac{1}{8}$	$1\frac{1}{4}$	3
$1\frac{41}{64}$	9.00	$16\frac{1}{4}$	$12\frac{1}{8}$	$1\frac{1}{4}$	3
$1\frac{7}{8}$	9.20	$16\frac{1}{2}$	$12\frac{1}{4}$	$1\frac{1}{4}$	3
$1\frac{43}{64}$	9.35	$16\frac{1}{2}$	$12\frac{1}{4}$	$1\frac{1}{4}$	3
$1\frac{15}{16}$	9.50	$16\frac{1}{2}$	$12\frac{1}{4}$	$1\frac{1}{4}$	3
$1\frac{45}{64}$	9.65	$16\frac{1}{2}$	$12\frac{1}{4}$	$1\frac{1}{4}$	3
2	9.80	$16\frac{1}{2}$	$12\frac{1}{8}$	$1\frac{1}{4}$	3
$2\frac{1}{32}$	10.20	$16\frac{1}{2}$	$11\frac{3}{4}$	$1\frac{1}{2}$	$3\frac{1}{2}$
$2\frac{1}{16}$	10.60	17	$12\frac{1}{4}$	$1\frac{1}{2}$	$3\frac{1}{2}$
$2\frac{3}{32}$	10.90	17	$12\frac{1}{4}$	$1\frac{1}{2}$	$3\frac{1}{2}$

\*Drills  $1\frac{17}{32}$  inches and larger take a different discount than  $1\frac{1}{2}$  inches and smaller.  
 Drills larger than  $1\frac{1}{2}$  inches are furnished in 64th sizes if ordered and take price of the next larger size listed.

**No. 104 H.**  
**FOUR-GROOVE DRILLS**  
 WITH 'STRAIGHT SHANKS.



Diameter, Inches.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.	Diameter Shank, Inches.	Length Shank, Inches.
2 1/8	\$11.20	17	12 1/8	1 1/2	3 1/2
2 5/32	11.60	17	12 1/8	1 1/2	3 1/2
2 3/16	12.00	17	12 1/8	1 1/2	3 1/2
2 7/32	12.40	17 1/2	12 5/8	1 1/2	3 1/2
2 1/4	12.80	17 1/2	12 1/2	1 1/2	3 1/2
2 3/8	13.20	17 1/2	12 1/2	1 1/2	3 1/2
2 5/8	13.60	17 1/2	12 1/2	1 1/2	3 1/2
2 11/32	14.00	18	13	1 1/2	3 1/2
2 3/8	14.40	18	12 7/8	1 1/2	3 1/2
2 13/32	14.70	18 1/2	13 3/8	1 1/2	3 1/2
2 7/16	15.00	18 1/2	13 3/8	1 1/2	3 1/2
2 15/32	15.30	19	13 7/8	1 1/2	3 1/2
2 1/2	15.60	19	13 3/4	1 1/2	3 1/2
2 17/32	15.90	19 1/4	14	1 1/2	3 1/2
2 9/16	16.20	19 1/4	14	1 1/2	3 1/2
2 19/32	16.50	19 1/2	14 1/4	1 1/2	3 1/2
2 5/8	16.80	19 1/2	14 1/8	1 1/2	3 1/2
2 31/32	17.35	20	14 5/8	1 1/2	3 1/2
2 11/16	17.90	20	14 5/8	1 1/2	3 1/2
2 23/32	18.45	20 1/2	15 1/8	1 1/2	3 1/2
2 3/4	19.00	20 1/2	15	1 1/2	3 1/2
2 35/32	19.50	20 1/2	14 1/2	1 3/4	4
2 13/16	20.00	20 1/2	14 1/2	1 3/4	4
2 33/32	20.50	21	15	1 3/4	4
2 7/8	21.00	21	14 7/8	1 3/4	4
2 39/32	22.00	21	14 7/8	1 3/4	4
2 15/16	23.00	21	14 7/8	1 3/4	4
2 31/32	24.00	22	15 7/8	1 3/4	4
3	25.00	22	15 3/4	1 3/4	4

Drills 1 1/4 inches and larger take a different discount than 1 1/2 inches and smaller.

Drills larger than 1 1/2 inches are furnished in 64th sizes if ordered and take price of the next larger size listed.

For No. 104K see pages 138-140; 104L, 141-143; 104M, 43-48; 104N, 49.

# **No. 102 H. SHELL DRILLS.**



ANGLE OF SPIRAL 15°.

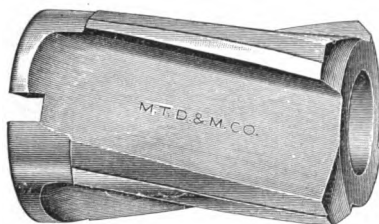
Diameter, Inches.	Price Each.	Whole Length, Inches.	Length of Flutes, Inches.	Size Hole, Inches.
1 $\frac{1}{16}$	\$3.80	3 $\frac{1}{2}$	2 $\frac{3}{4}$	1
1 $\frac{3}{16}$	4.10	3 $\frac{1}{2}$	2 $\frac{3}{4}$	1
1 $\frac{1}{8}$	4.40	3 $\frac{1}{2}$	2 $\frac{3}{4}$	1
1 $\frac{7}{16}$	4.70	3 $\frac{1}{2}$	2 $\frac{3}{4}$	1
1 $\frac{1}{2}$	5.00	3 $\frac{1}{2}$	2 $\frac{3}{4}$	1
2	5.20	3 $\frac{1}{2}$	2 $\frac{3}{4}$	1
2 $\frac{1}{16}$	5.40	3 $\frac{3}{4}$	3	1 $\frac{1}{4}$
2 $\frac{1}{8}$	5.60	3 $\frac{3}{4}$	3	1 $\frac{1}{4}$
2 $\frac{3}{16}$	5.80	3 $\frac{3}{4}$	3	1 $\frac{1}{4}$
2 $\frac{1}{4}$	6.00	3 $\frac{3}{4}$	3	1 $\frac{1}{4}$
2 $\frac{5}{16}$	6.20	3 $\frac{3}{4}$	3	1 $\frac{1}{4}$
2 $\frac{3}{8}$	6.40	3 $\frac{3}{4}$	3	1 $\frac{1}{4}$
2 $\frac{7}{16}$	6.60	3 $\frac{3}{4}$	3	1 $\frac{1}{4}$
2 $\frac{1}{2}$	6.80	3 $\frac{3}{4}$	3	1 $\frac{1}{4}$
2 $\frac{9}{16}$	7.00	4	3 $\frac{1}{4}$	1 $\frac{1}{2}$
2 $\frac{5}{8}$	7.30	4	3 $\frac{1}{4}$	1 $\frac{1}{2}$
2 $\frac{11}{16}$	7.60	4	3 $\frac{1}{4}$	1 $\frac{1}{2}$
2 $\frac{3}{4}$	8.00	4	3 $\frac{1}{4}$	1 $\frac{1}{2}$
2 $\frac{7}{8}$	8.40	4	3 $\frac{1}{4}$	1 $\frac{1}{2}$
2 $\frac{15}{16}$	8.80	4	3 $\frac{1}{4}$	1 $\frac{1}{2}$
3	9.20	4	3 $\frac{1}{4}$	1 $\frac{1}{2}$
3 $\frac{1}{16}$	9.60	4	3 $\frac{1}{4}$	1 $\frac{1}{2}$
3 $\frac{1}{8}$	9.90	4 $\frac{1}{2}$	3 $\frac{5}{8}$	1 $\frac{3}{4}$
3 $\frac{3}{16}$	10.20	4 $\frac{1}{2}$	3 $\frac{5}{8}$	1 $\frac{3}{4}$
3 $\frac{1}{4}$	10.60	4 $\frac{1}{2}$	3 $\frac{5}{8}$	1 $\frac{3}{4}$
3 $\frac{5}{16}$	11.00	4 $\frac{1}{2}$	3 $\frac{5}{8}$	1 $\frac{3}{4}$
3 $\frac{3}{8}$	11.50	4 $\frac{1}{2}$	3 $\frac{5}{8}$	1 $\frac{3}{4}$

Shell Drills 1  $\frac{1}{16}$  inches to and including 3  $\frac{1}{4}$  inches have four flutes; 3  $\frac{3}{8}$  inches to and including 5 inches have six flutes.

Shell Drills take the same arbors as regular Shell Reamers. These arbors are illustrated on pages 153, 156, 158



## No. 102 H. SHELL DRILLS.

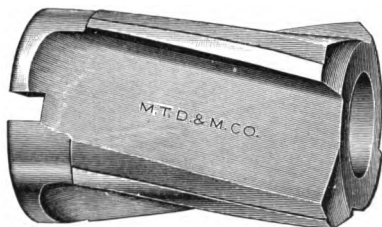


ANGLE OF SPIRAL 15°.

Diameter,* Inches.	Price Each.	Whole Length, Inches.	Length of Flutes, Inches.	Size Hole, Inches.
3 3/8	\$12.00	4 1/2	3 5/8	1 3/4
3 7/16	12.50	4 1/2	3 5/8	1 3/4
3 1/2	13.00	4 1/2	3 5/8	1 3/4
3 9/16	13.50	5	4	2
3 5/8	14.00	5	4	2
3 11/16	14.50	5	4	2
3 3/4	15.00	5	4	2
3 13/16	15.50	5	4	2
3 7/8	16.00	5	4	2
3 15/16	17.00	5	4	2
4	18.00	5	4	2
4 1/16	18.30	5 1/2	4 3/8	2 1/4
4 1/8	18.60	5 1/2	4 3/8	2 1/4
4 3/16	19.00	5 1/2	4 3/8	2 1/4
4 1/4	19.40	5 1/2	4 3/8	2 1/4
4 5/16	19.80	5 1/2	4 3/8	2 1/4
4 3/8	20.20	5 1/2	4 3/8	2 1/4
4 7/16	20.60	5 1/2	4 3/8	2 1/4
4 1/2	21.00	5 1/2	4 3/8	2 1/4
4 9/16	21.60	6	4 3/4	2 1/2
4 5/8	22.20	6	4 3/4	2 1/2
4 11/16	22.80	6	4 3/4	2 1/2
4 3/4	23.40	6	4 3/4	2 1/2
4 13/16	24.00	6	4 3/4	2 1/2
4 7/8	24.60	6	4 3/4	2 1/2
4 15/16	25.20	6	4 3/4	2 1/2
5	26.00	6	4 3/4	2 1/2

Shell Drills 1 1/4 inches to and including 3 1/2 inches have four flutes; 3 5/8 inches to and including 5 inches have six flutes.

Shell Drills take the same arbors as regular Shell Reamers. These arbors are illustrated on pages 153, 156, 158.



## No. 102 1/2 H. SHELL DRILLS

WITH STRAIGHT HOLES.

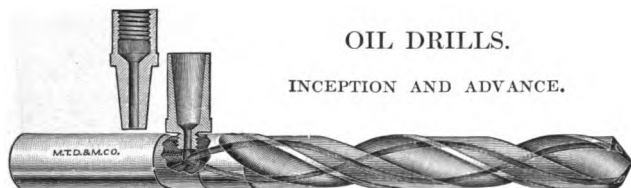
ANGLE OF SPIRAL 15°.

Diam. Inches.	Price Each.	Whole Length, Inches.	Diam. of Hole, Inches.	Diam., Inches.	Price Each.	Whole Length, Inches.	Diam. of Hole, Inches.
1 1/8	\$1.80	2 5/8	1/2	3 1/8	\$9.90	3	1
1 1/8	1.90	2 5/8	1/2	3 1/8	10.20	3	1
1 3/8	2.00	2 5/8	1/2	3 3/8	10.60	3	1
1 1/4	2.20	2 5/8	1/2	3 1/4	11.00	3 1/4	1 1/4
1 5/8	2.40	2 5/8	1/2	3 5/8	11.50	3 1/4	1 1/4
1 3/8	2.60	2 3/4	5/8	3 3/8	12.00	3 1/4	1 1/4
1 7/8	2.80	2 3/4	5/8	3 7/8	12.50	3 1/4	1 1/4
1 1/2	3.00	2 3/4	5/8	3 1/2	13.00	3 1/4	1 1/4
1 9/8	3.20	2 3/4	5/8	3 9/8	13.50	3 1/4	1 1/4
1 5/8	3.50	2 3/4	5/8	3 5/8	14.00	3 1/4	1 1/4
1 11/8	3.80	2 3/4	5/8	3 11/8	14.50	3 1/4	1 1/4
1 3/4	4.10	2 3/4	5/8	3 3/4	15.00	3 5/8	1 1/2
1 11/8	4.40	2 3/4	5/8	3 11/8	15.50	3 5/8	1 1/2
1 1/8	4.70	2 3/4	3/4	3 7/8	16.00	3 5/8	1 1/2
1 11/8	5.00	2 3/4	3/4	3 11/8	17.00	3 5/8	1 1/2
2	5.20	2 3/4	3/4	4	18.00	3 5/8	1 1/2
2 1/8	5.40	2 3/4	3/4	4 1/8	18.30	3 5/8	1 1/2
2 3/8	5.60	2 3/4	3/4	4 1/8	18.60	3 5/8	1 1/2
2 7/8	5.80	2 3/4	3/4	4 7/8	19.00	3 5/8	1 1/2
2 1/4	6.00	2 3/4	3/4	4 1/4	19.40	4	2
2 5/8	6.20	2 3/4	3/4	4 5/8	19.80	4	2
2 3/8	6.40	2 3/4	3/4	4 3/8	20.20	4	2
2 7/8	6.60	2 3/4	3/4	4 7/8	20.60	4	2
2 1/2	6.80	3	1	4 1/2	21.00	4	2
2 9/8	7.00	3	1	4 9/8	21.60	4	2
2 5/8	7.30	3	1	4 5/8	22.20	4	2
2 11/8	7.60	3	1	4 11/8	22.80	4	2
2 3/4	8.00	3	1	4 3/4	23.40	4	2
2 7/8	8.40	3	1	4 7/8	24.00	4	2
2 1/8	8.80	3	1	4 1/8	24.60	4	2
2 5/8	9.20	3	1	4 5/8	25.20	4	2
3	9.60	3	1	5	26.00	4	2

These Drills are made .010 under size, and are intended to be used as a Roughing Tool in a cored or drilled hole.

For Arbors fitting these Drills see pages 157 and 159.

For other Tools to be used in connection with these Drills see pages 157, 159, 181, 237.



## OIL DRILLS.

INCEPTION AND ADVANCE.

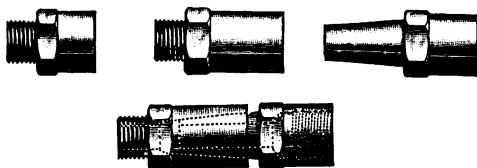
This method of conveying lubricants to the point of a drill or cutting tool was exhibited by the Morse Twist Drill & Machine Company at the World's Fair at Chicago in 1893, the drills then exhibited being duplicates of some made during the two previous years. The "American Machinist" and "Iron Age" in the year 1893 illustrated and explained this style of tool.

Various devices have been used to convey the lubricant to the points, the early methods providing for an inserted tube. The latest improvements, however, provide holes through the solid metal, drills of this style being made SOLELY by this Company under patents owned by it, dated Sept. 7, 1897.

All oil drills  $2\frac{1}{2}$  inches and smaller in diameter have holes through the solid metal, while with sizes larger than  $2\frac{1}{2}$  inches it has been found advisable to mill the oil channels and cover them. These drills are not made smaller than  $\frac{3}{16}$  diameter except at customers risk. Sizes  $\frac{3}{16}$  and smaller are furnished with one oil hole only. They can be furnished with two if especially ordered, but at customer's risk.

Oil drills are illustrated and their manner of use fully explained on pages 116 to 143.

## CUPS FOR USE IN OIL DRILLS.



In ordering new cups give size of drill in which they are to be used.

## OIL DRILLS OF SPECIAL LENGTHS.

## No. 104 C.

WITH STRAIGHT SHANKS.



## No. 102 D.

WITH TAPER SHANKS.

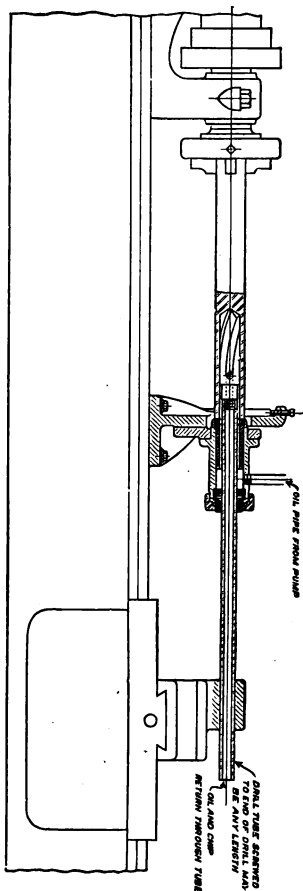


These cuts are a reproduction on a small scale of drills which were actually made and used with eminent satisfaction, the proportion of the cuts to the drills being correct. The actual dimensions of the drills were, diameter  $3\frac{1}{2}$  inches, whole length 52 inches, length of shank  $8\frac{1}{8}$  inches.

## INFORMATION AS TO USE OF DRILLS

### WITH CHANNELS OR HOLES FOR LUBRICANTS.

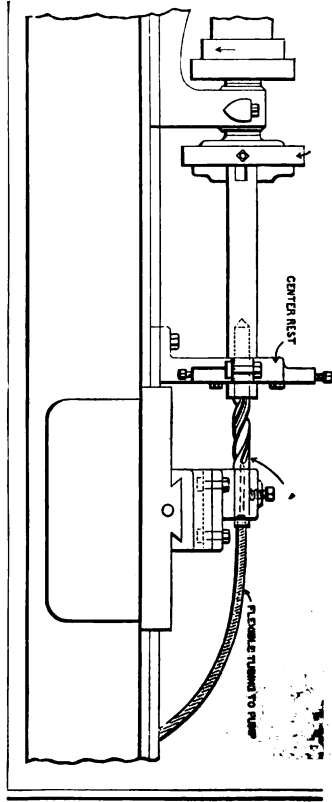
Cut showing manner of applying a Hollow Drill for drilling deep holes.  
For Hollow Drills, see page 144.



Cut showing method of applying a Drill with Oil Holes; the drill not to revolve.

The Drills are furnished with Straight or Taper Shanks, as desired.

For Drills with Oil Holes of style shown below, see pages 122-125; 132-143.

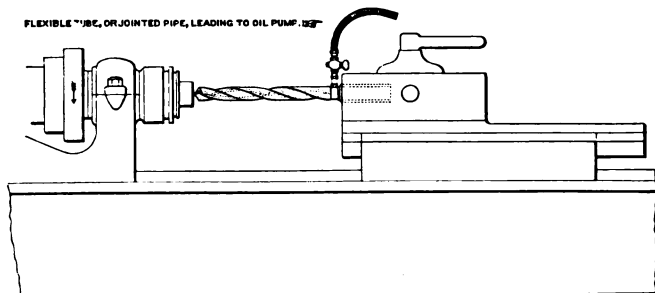


In using the Hollow Drill the hole is first to be started by means of a short drill of the size of the hole desired, and drilled to a depth equal to the length of the body of the Hollow Drill afterwards to be employed. The body of the Hollow Drill acts as a stuffing, compelling the oil to follow the grooves and the chips to flow out through the hollow shank.

## INFORMATION AS TO USE OF DRILLS

### WITH HOLES FOR LUBRICANTS.

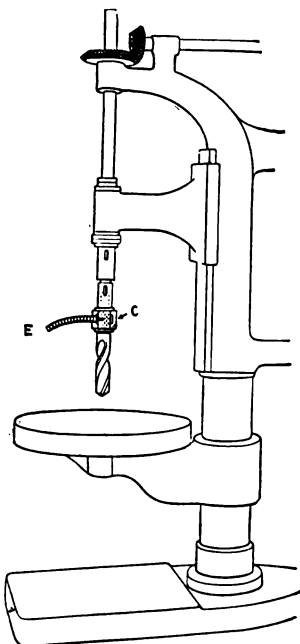
Cut showing a Drill with Oil Holes as used in a Turret Head Lathe.  
For Drills with Oil Holes of style shown below, see pages 118-121; 130-131.  
The Drills are furnished with Straight or Taper Shanks, as desired.



Cut showing method of supplying a Drill with Oil, the Drill revolving.

For Drills with Oil Holes of this style see pages 126-129.

For Sockets of this style see page 8 Nos. 100D and 100E.

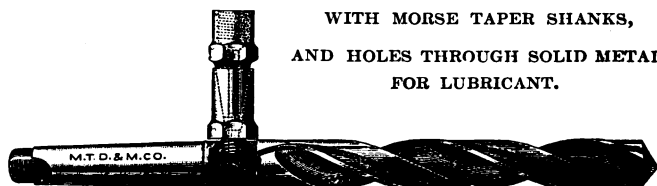


A flexible tube *E* conveys oil from the oil pump to the chuck *C*, which admits of passage of oil to the point of the Drill.

## No. 102 A.

## PATENT CONSTANT ANGLE TWIST DRILLS

WITH MORSE TAPER SHANKS,  
AND HOLES THROUGH SOLID METAL  
FOR LUBRICANT.



Diameter, Inches.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.	Morse Taper Shank.
$\frac{3}{8}$	\$3.00	$6\frac{3}{4}$	$3\frac{5}{8}$	No. 1.
$\frac{7}{16}$	3.15	7	$3\frac{9}{16}$	
$\frac{1}{2}$	3.15	7	$3\frac{9}{16}$	
$\frac{9}{16}$	3.30	$7\frac{1}{4}$	$3\frac{13}{16}$	
$\frac{5}{8}$	3.30	$7\frac{1}{4}$	$3\frac{13}{16}$	
$\frac{11}{16}$	3.85	$7\frac{1}{2}$	$4\frac{1}{16}$	
* $\frac{3}{4}$	3.85	$7\frac{1}{2}$	$4\frac{1}{16}$	
$\frac{13}{16}$	4.00	$7\frac{3}{4}$	$4\frac{5}{16}$	
$\frac{7}{8}$	4.00	$7\frac{3}{4}$	$4\frac{5}{16}$	
$\frac{15}{16}$	4.15	8	$4\frac{9}{16}$	
$\frac{1}{8}$	4.15	8	$4\frac{9}{16}$	
$\frac{9}{16}$	4.30	$8\frac{1}{4}$	$4\frac{13}{16}$	
$\frac{5}{8}$	4.30	$8\frac{1}{4}$	$4\frac{13}{16}$	
$\frac{11}{16}$	4.50	$8\frac{1}{2}$	$4\frac{1}{2}$	
$\frac{3}{4}$	4.50	$8\frac{1}{2}$	$4\frac{1}{2}$	
$\frac{13}{16}$	4.70	$8\frac{3}{4}$	$4\frac{3}{4}$	No. 2.
$\frac{7}{8}$	4.70	$8\frac{3}{4}$	$4\frac{3}{4}$	
$\frac{15}{16}$	4.80	9	$4\frac{7}{8}$	
$\frac{1}{8}$	4.80	9	$4\frac{7}{8}$	
$\frac{9}{16}$	4.95	$9\frac{1}{4}$	$5\frac{1}{8}$	
$\frac{5}{8}$	4.95	$9\frac{1}{4}$	$5\frac{1}{8}$	
$\frac{11}{16}$	5.10	$9\frac{1}{2}$	$5\frac{3}{8}$	
$\frac{3}{4}$	5.10	$9\frac{1}{2}$	$5\frac{3}{8}$	
$\frac{13}{16}$	5.20	$9\frac{3}{4}$	$5\frac{5}{8}$	
$\frac{7}{8}$	5.20	$9\frac{3}{4}$	$5\frac{5}{8}$	
$\frac{15}{16}$	5.35	$9\frac{7}{8}$	$5\frac{3}{4}$	
$\frac{1}{8}$	5.35	$9\frac{7}{8}$	$5\frac{3}{4}$	

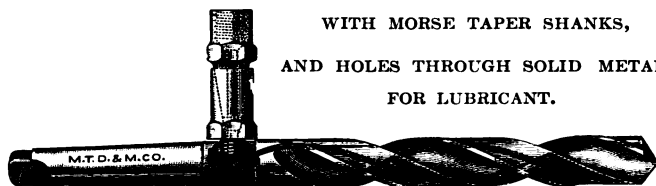
\*These drills  $\frac{1}{8}$  and smaller are furnished with one oil hole only. They can be furnished with two if ordered, but at customer's risk.

For information in regard to manner of use see page 117.

## No. 102 A.

## PATENT CONSTANT ANGLE TWIST DRILLS

WITH MORSE TAPER SHANKS,  
AND HOLES THROUGH SOLID METAL  
FOR LUBRICANT.

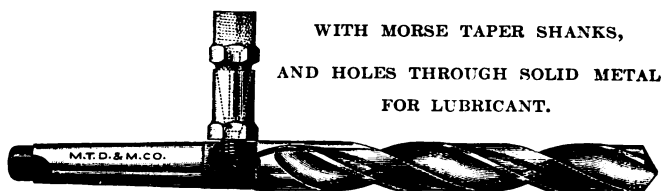


Diameter, Inches.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.	Morse Taper Shank.
$\frac{1}{16}$	\$5.50	10	$5\frac{7}{8}$	No. 2
$\frac{1}{8}$	5.50	10	$5\frac{7}{8}$	
$\frac{3}{16}$	5.70	$10\frac{1}{4}$	$6\frac{1}{8}$	
$\frac{1}{4}$	5.70	$10\frac{1}{4}$	$6\frac{1}{8}$	
$\frac{5}{16}$	5.90	$10\frac{1}{2}$	$6\frac{3}{8}$	
$\frac{3}{8}$	5.90	$10\frac{1}{2}$	$6\frac{3}{8}$	
$\frac{7}{16}$	6.05	$10\frac{5}{8}$	$6\frac{1}{2}$	
$\frac{1}{2}$	6.05	$10\frac{5}{8}$	$6\frac{1}{2}$	
$\frac{9}{16}$	6.20	$10\frac{3}{4}$	$5\frac{7}{8}$	
$\frac{5}{8}$	6.20	$10\frac{3}{4}$	$5\frac{7}{8}$	
$\frac{11}{16}$	6.35	$10\frac{7}{8}$	6	
$\frac{3}{4}$	6.35	$10\frac{7}{8}$	6	
$\frac{13}{16}$	6.50	11	$6\frac{1}{8}$	
1	6.50	11	$6\frac{1}{8}$	
$1\frac{1}{16}$	6.80	$11\frac{1}{8}$	$6\frac{1}{4}$	No. 3
$1\frac{1}{8}$	6.80	$11\frac{1}{8}$	$6\frac{1}{4}$	
$1\frac{3}{16}$	7.10	$11\frac{1}{4}$	$6\frac{3}{8}$	
$1\frac{1}{4}$	7.10	$11\frac{1}{4}$	$6\frac{3}{8}$	
$1\frac{5}{16}$	7.45	$11\frac{1}{2}$	$6\frac{5}{8}$	
$1\frac{3}{8}$	7.45	$11\frac{1}{2}$	$6\frac{5}{8}$	
$1\frac{7}{16}$	7.80	$11\frac{3}{4}$	$6\frac{7}{8}$	
$1\frac{1}{2}$	7.80	$11\frac{3}{4}$	$6\frac{7}{8}$	
$1\frac{9}{16}$	8.00	$11\frac{7}{8}$	7	
$1\frac{5}{8}$	8.00	$11\frac{7}{8}$	7	
$1\frac{11}{16}$	8.20	12	$7\frac{1}{8}$	
$1\frac{3}{4}$	8.20	12	$7\frac{1}{8}$	
$1\frac{13}{16}$	8.40	$12\frac{1}{8}$	$7\frac{1}{4}$	

For information in regard to manner of use see page 117.

## No. 102 A.

## PATENT CONSTANT ANGLE TWIST DRILLS



Diameter, Inches.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.	Morse Taper Shank.
$1\frac{7}{32}$	\$8.40	$12\frac{1}{8}$	$7\frac{1}{4}$	No. 3.
$1\frac{11}{64}$	8.70	$12\frac{1}{2}$	$7\frac{5}{8}$	
$1\frac{1}{4}$	8.70	$12\frac{1}{2}$	$7\frac{5}{8}$	
$1\frac{17}{64}$	9.40	$14\frac{1}{8}$	$8\frac{1}{4}$	
$1\frac{9}{32}$	9.40	$14\frac{1}{8}$	$8\frac{1}{4}$	
$1\frac{19}{64}$	10.15	$14\frac{1}{4}$	$8\frac{3}{8}$	
$1\frac{5}{16}$	10.15	$14\frac{1}{4}$	$8\frac{3}{8}$	
$1\frac{21}{64}$	10.95	$14\frac{3}{8}$	$8\frac{1}{2}$	
$1\frac{11}{32}$	10.95	$14\frac{3}{8}$	$8\frac{1}{2}$	
$1\frac{23}{64}$	11.80	$14\frac{1}{2}$	$8\frac{5}{8}$	
$1\frac{3}{8}$	11.80	$14\frac{1}{2}$	$8\frac{5}{8}$	No. 4.
$1\frac{25}{64}$	12.30	$14\frac{5}{8}$	$8\frac{5}{8}$	
$1\frac{13}{32}$	12.30	$14\frac{5}{8}$	$8\frac{5}{8}$	
$1\frac{27}{64}$	12.85	$14\frac{3}{4}$	$8\frac{3}{4}$	
$1\frac{7}{16}$	12.85	$14\frac{3}{4}$	$8\frac{3}{4}$	
$1\frac{29}{64}$	13.35	$14\frac{7}{8}$	$8\frac{7}{8}$	
$1\frac{15}{32}$	13.35	$14\frac{7}{8}$	$8\frac{7}{8}$	
$1\frac{31}{64}$	14.00	15	9	
$1\frac{1}{2}$	14.00	15	9	
$1\frac{33}{64}$	14.20	15	9	
$1\frac{17}{32}$	14.20	15	9	
$1\frac{35}{64}$	14.40	$15\frac{1}{4}$	$9\frac{1}{4}$	
$1\frac{9}{16}$	14.40	$15\frac{1}{4}$	$9\frac{1}{4}$	
$1\frac{37}{64}$	14.70	$15\frac{1}{4}$	$9\frac{1}{4}$	
$1\frac{19}{32}$	14.70	$15\frac{1}{4}$	$9\frac{1}{4}$	
$1\frac{39}{64}$	15.00	$15\frac{1}{2}$	$9\frac{1}{2}$	

For information in regard to manner of use see page 117.



## No. 102 A.

## PATENT CONSTANT ANGLE TWIST DRILLS

WITH MORSE TAPER SHANKS,  
AND HOLES THROUGH SOLID METAL  
FOR LUBRICANT.



Diameter, Inches.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.	Morse Taper Shank.
1 5/8	\$15.00	15 1/2	9 1/2	No. 4.
1 11/16	15.35	15 1/2	9 1/2	
1 13/16	15.35	15 1/2	9 1/2	
1 7/8	15.70	15 3/4	9 3/4	
1 15/16	15.70	15 3/4	9 3/4	
1 1/8	16.10	15 3/4	9 3/4	
1 13/16	16.10	15 3/4	9 5/16	
1 7/8	16.50	16	9 9/16	
1 15/16	16.50	16	9 9/16	
1 1/4	16.75	16	9 9/16	
1 13/16	16.75	16	9 9/16	
1 7/8	17.00	16 1/4	9 13/16	
1 15/16	17.00	16 1/4	9 3/4	
1 1/2	17.25	16 1/4	9 3/4	
1 13/16	17.25	16 1/4	9 3/4	
1 7/8	17.50	16 1/2	10	
1 15/16	17.50	16 1/2	10	
1 1/2	17.85	16 1/2	10	
1 13/16	17.85	16 1/2	10	
1 7/8	18.20	16 1/2	10	
1 15/16	18.20	16 1/2	9 7/8	
1 1/2	18.60	16 1/2	9 7/8	
1 13/16	18.60	16 1/2	9 7/8	
1 7/8	19.00	16 1/2	9 7/8	
1 15/16	19.00	16 1/2	9 7/8	
2				

For information in regard to manner of use see page 117.

**No. 102 B.**  
**PATENT CONSTANT ANGLE TWIST DRILLS**  
 WITH MORSE TAPER SHANKS,  
 AND HOLES THROUGH SOLID METAL FOR LUBRICANT.



Diameter, Inches.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.	Morse Taper Shank.
$\frac{3}{8}$	\$3.00	$6\frac{3}{4}$	$3\frac{7}{16}$	No. 1.
$\frac{25}{64}$	3.15	7	$3\frac{11}{16}$	
$\frac{13}{32}$	3.15	7	$3\frac{11}{16}$	
$\frac{27}{64}$	3.30	$7\frac{1}{4}$	$3\frac{15}{16}$	
$\frac{7}{16}$	3.30	$7\frac{1}{4}$	$3\frac{15}{16}$	
$\frac{29}{64}$	3.85	$7\frac{1}{2}$	$4\frac{3}{16}$	
* $\frac{15}{32}$	3.85	$7\frac{1}{2}$	$4\frac{3}{16}$	
$\frac{31}{64}$	4.00	$7\frac{3}{4}$	$4\frac{7}{16}$	
$\frac{1}{2}$	4.00	$7\frac{3}{4}$	$4\frac{7}{16}$	
$\frac{33}{64}$	4.15	8	$4\frac{11}{16}$	
$\frac{17}{32}$	4.15	8	$4\frac{11}{16}$	
$\frac{35}{64}$	4.30	$8\frac{1}{4}$	$4\frac{15}{16}$	
$\frac{9}{16}$	4.30	$8\frac{1}{4}$	$4\frac{15}{16}$	
$\frac{37}{64}$	4.50	$8\frac{1}{2}$	$4\frac{5}{8}$	
$\frac{19}{32}$	4.50	$8\frac{1}{2}$	$4\frac{5}{8}$	
$\frac{39}{64}$	4.70	$8\frac{3}{4}$	$4\frac{7}{8}$	No. 2.
$\frac{5}{8}$	4.70	$8\frac{3}{4}$	$4\frac{7}{8}$	
$\frac{41}{64}$	4.80	9	$5\frac{1}{8}$	
$\frac{21}{32}$	4.80	9	$5\frac{1}{8}$	
$\frac{43}{64}$	4.95	$9\frac{1}{4}$	$5\frac{3}{8}$	
$\frac{11}{16}$	4.95	$9\frac{1}{4}$	$5\frac{3}{8}$	
$\frac{45}{64}$	5.10	$9\frac{1}{2}$	$5\frac{5}{8}$	
$\frac{23}{32}$	5.10	$9\frac{1}{2}$	$5\frac{5}{8}$	
$\frac{47}{64}$	5.20	$9\frac{3}{4}$	$5\frac{7}{8}$	
$\frac{3}{4}$	5.20	$9\frac{3}{4}$	$5\frac{7}{8}$	
$\frac{49}{64}$	5.35	$9\frac{7}{8}$	6	
$\frac{25}{32}$	5.35	$9\frac{7}{8}$	6	

These drills have holes through the solid metal and have great advantages over any other drill devised for conveying lubricants as well as air to the point. Air is sometimes used for blowing out the chips and keeping the drill cool.

\*These drills  $\frac{15}{32}$  and smaller are furnished with one oil hole only. They can be furnished with two if ordered, but at customer's risk.

For information in regard to manner of use see page 116.

**No. 102 B.**  
**PATENT CONSTANT ANGLE TWIST DRILLS**  
 WITH MORSE TAPER SHANKS,  
 AND HOLES THROUGH SOLID METAL FOR LUBRICANT.



Diameter, Inches.	Price Each.	Whole Length Inches.	Twist Cut, Inches.	Morse Taper Shank.
$\frac{5}{64}$	\$5.50	10	$6\frac{1}{8}$	No. 2.
$\frac{1}{16}$	5.50	10	$6\frac{1}{8}$	
$\frac{5}{64}$	5.70	$10\frac{1}{4}$	$6\frac{3}{8}$	
$\frac{3}{32}$	5.70	$10\frac{1}{4}$	$6\frac{3}{8}$	
$\frac{5}{64}$	5.90	$10\frac{1}{2}$	$6\frac{5}{8}$	
$\frac{7}{8}$	5.90	$10\frac{1}{2}$	$6\frac{5}{8}$	
$\frac{5}{64}$	6.05	$10\frac{5}{8}$	$6\frac{3}{4}$	
$\frac{3}{32}$	6.05	$10\frac{5}{8}$	$6\frac{3}{4}$	
$\frac{5}{64}$	6.20	$10\frac{3}{4}$	$6\frac{1}{8}$	
$\frac{1}{16}$	6.20	$10\frac{3}{4}$	$6\frac{1}{8}$	
$\frac{5}{64}$	6.35	$10\frac{7}{8}$	$6\frac{1}{4}$	
$\frac{3}{32}$	6.35	$10\frac{7}{8}$	$6\frac{1}{4}$	
$\frac{5}{64}$	6.50	11	$6\frac{3}{8}$	
1	6.50	11	$6\frac{3}{8}$	
$1\frac{1}{64}$	6.80	$11\frac{1}{8}$	$6\frac{1}{2}$	No. 3.
$1\frac{1}{32}$	6.80	$11\frac{1}{8}$	$6\frac{1}{2}$	
$1\frac{3}{64}$	7.10	$11\frac{1}{4}$	$6\frac{5}{8}$	
$1\frac{1}{16}$	7.10	$11\frac{1}{4}$	$6\frac{5}{8}$	
$1\frac{5}{64}$	7.45	$11\frac{1}{2}$	$6\frac{7}{8}$	
$1\frac{3}{32}$	7.45	$11\frac{1}{2}$	$6\frac{7}{8}$	
$1\frac{7}{64}$	7.80	$11\frac{3}{4}$	$7\frac{1}{8}$	
$1\frac{1}{8}$	7.80	$11\frac{3}{4}$	$7\frac{1}{8}$	
$1\frac{9}{64}$	8.00	$11\frac{7}{8}$	$7\frac{1}{4}$	
$1\frac{5}{32}$	8.00	$11\frac{7}{8}$	$7\frac{1}{4}$	
$1\frac{11}{64}$	8.20	12	$7\frac{3}{8}$	
$1\frac{3}{16}$	8.20	12	$7\frac{3}{8}$	

These drills have holes through the solid metal and have great advantages over any other drill devised for conveying lubricants as well as air to the point. Air is sometimes used for blowing out the chips and keeping the drill cool.

For information in regard to manner of use see page 116.

**No. 102 B.****PATENT CONSTANT ANGLE TWIST DRILLS**

WITH MORSE TAPER SHANKS,

AND HOLES THROUGH SOLID METAL FOR LUBRICANT.



Diameter, Inches.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.	Morse Taper Shank.
$1\frac{1}{4}$	\$8.40	$12\frac{1}{8}$	$7\frac{1}{2}$	No. 3.
$1\frac{7}{32}$	8.40	$12\frac{1}{8}$	$7\frac{1}{2}$	
$1\frac{15}{64}$	8.70	$12\frac{1}{2}$	$7\frac{7}{8}$	
$1\frac{1}{4}$	8.70	$12\frac{1}{2}$	$7\frac{7}{8}$	
$1\frac{17}{64}$	9.40	$14\frac{1}{8}$	$8\frac{1}{2}$	
$1\frac{9}{32}$	9.40	$14\frac{1}{8}$	$8\frac{1}{2}$	
$1\frac{19}{64}$	10.15	$14\frac{1}{4}$	$8\frac{5}{8}$	
$1\frac{5}{16}$	10.15	$14\frac{1}{4}$	$8\frac{5}{8}$	
$1\frac{21}{64}$	10.95	$14\frac{3}{8}$	$8\frac{3}{4}$	
$1\frac{11}{32}$	10.95	$14\frac{3}{8}$	$8\frac{3}{4}$	
$1\frac{23}{64}$	11.80	$14\frac{1}{2}$	$8\frac{7}{8}$	
$1\frac{3}{8}$	11.80	$14\frac{1}{2}$	$8\frac{7}{8}$	
$1\frac{25}{64}$	12.30	$14\frac{5}{8}$	9	No. 4.
$1\frac{13}{32}$	12.30	$14\frac{5}{8}$	9	
$1\frac{27}{64}$	12.85	$14\frac{3}{4}$	$9\frac{1}{8}$	
$1\frac{7}{16}$	12.85	$14\frac{3}{4}$	$9\frac{1}{8}$	
$1\frac{29}{64}$	13.35	$14\frac{7}{8}$	$9\frac{1}{4}$	
$1\frac{15}{32}$	13.35	$14\frac{7}{8}$	$9\frac{1}{4}$	
$1\frac{31}{64}$	14.00	15	$9\frac{3}{8}$	
$1\frac{1}{2}$	14.00	15	$9\frac{3}{8}$	
$1\frac{33}{64}$	14.20	15	$9\frac{3}{8}$	
$1\frac{17}{32}$	14.20	15	$9\frac{3}{8}$	
$1\frac{35}{64}$	14.40	$15\frac{1}{4}$	$9\frac{5}{8}$	
$1\frac{9}{16}$	14.40	$15\frac{1}{4}$	$9\frac{5}{8}$	
$1\frac{37}{64}$	14.70	$15\frac{1}{4}$	$9\frac{5}{8}$	
$1\frac{19}{32}$	14.70	$15\frac{1}{4}$	$9\frac{5}{8}$	

These drills have holes through the solid metal and have great advantages over any other drills devised for conveying lubricants as well as air to the points. Air is sometimes used for blowing out the chips and keeping the drill cool.

For information in regard to manner of use see page 116.

**No. 102 B.**  
**PATENT CONSTANT ANGLE TWIST DRILLS**  
 WITH MORSE TAPER SHANKS,  
 AND HOLES THROUGH SOLID METAL FOR LUBRICANT.



Diameter, Inches.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.	Morse Taper Shank.
$1\frac{3}{8}$	\$15.00	$15\frac{1}{2}$	$9\frac{7}{8}$	No. 4.
$1\frac{5}{8}$	15.00	$15\frac{1}{2}$	$9\frac{7}{8}$	
$1\frac{7}{8}$	15.35	$15\frac{1}{2}$	$9\frac{7}{8}$	
$1\frac{3}{4}$	15.35	$15\frac{1}{2}$	$9\frac{7}{8}$	
$1\frac{1}{2}$	15.70	$15\frac{3}{4}$	$10\frac{1}{8}$	
$1\frac{1}{8}$	15.70	$15\frac{3}{4}$	$10\frac{1}{8}$	
$1\frac{1}{4}$	16.10	$15\frac{3}{4}$	$10\frac{1}{8}$	
$1\frac{3}{8}$	16.10	$15\frac{3}{4}$	$9\frac{1}{2}$	
$1\frac{1}{2}$	16.50	16	$9\frac{1}{2}$	
$1\frac{3}{4}$	16.50	16	$9\frac{1}{2}$	
$1\frac{1}{4}$	16.75	16	$9\frac{1}{2}$	
$1\frac{3}{8}$	16.75	16	$9\frac{1}{2}$	
$1\frac{1}{2}$	17.00	$16\frac{1}{4}$	$10\frac{3}{8}$	
$1\frac{1}{8}$	17.00	$16\frac{1}{4}$	$10\frac{1}{8}$	
$1\frac{3}{4}$	17.25	$16\frac{1}{4}$	$10\frac{1}{8}$	
$1\frac{3}{8}$	17.25	$16\frac{1}{4}$	$10\frac{1}{8}$	
$1\frac{1}{2}$	17.50	$16\frac{1}{2}$	$10\frac{3}{8}$	
$1\frac{7}{8}$	17.50	$16\frac{1}{2}$	$10\frac{3}{8}$	
$1\frac{1}{4}$	17.85	$16\frac{1}{2}$	$10\frac{3}{8}$	
$1\frac{3}{8}$	17.85	$16\frac{1}{2}$	$10\frac{3}{8}$	
$1\frac{1}{2}$	18.20	$16\frac{1}{2}$	$10\frac{3}{8}$	
$1\frac{1}{8}$	18.20	$16\frac{1}{2}$	$10\frac{1}{4}$	
$1\frac{3}{4}$	18.60	$16\frac{1}{2}$	$10\frac{1}{4}$	
$1\frac{3}{8}$	18.60	$16\frac{1}{2}$	$10\frac{1}{4}$	
$1\frac{1}{2}$	19.00	$16\frac{1}{2}$	$10\frac{1}{4}$	
2	19.00	$16\frac{1}{2}$	$10\frac{1}{4}$	

These drills have holes through the solid metal and have great advantages over any other drill devised for conveying lubricants as well as air to the point. Air is sometimes used for blowing out the chips and keeping the drill cool.

For information in regard to manner of use see page 116.

**No. 102 C.**  
**PATENT CONSTANT ANGLE TWIST DRILLS**  
 WITH MORSE TAPER SHANKS,  
 AND HOLES THROUGH SOLID METAL FOR LUBRICANT.



Diameter, Inches.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.	Morse Taper Shank.
$\frac{3}{8}$	\$3.00	$6\frac{3}{4}$	$3\frac{7}{8}$	No. 1.
$\frac{7}{16}$	3.15	7	$3\frac{11}{16}$	
$\frac{1}{2}$	3.15	7	$3\frac{11}{16}$	
$\frac{9}{16}$	3.30	$7\frac{1}{4}$	$3\frac{11}{16}$	
$\frac{5}{8}$	3.30	$7\frac{1}{4}$	$3\frac{11}{16}$	
$\frac{11}{16}$	3.85	$7\frac{1}{2}$	$4\frac{3}{16}$	
* $\frac{3}{4}$	3.85	$7\frac{1}{2}$	$4\frac{3}{16}$	
$\frac{13}{16}$	4.00	$7\frac{3}{4}$	$4\frac{7}{16}$	
$\frac{7}{8}$	4.00	$7\frac{3}{4}$	$4\frac{7}{16}$	
$\frac{15}{16}$	4.15	8	$4\frac{11}{16}$	
$\frac{17}{16}$	4.15	8	$4\frac{11}{16}$	
$\frac{19}{16}$	4.30	$8\frac{1}{4}$	$4\frac{11}{16}$	
$\frac{21}{16}$	4.30	$8\frac{1}{4}$	$4\frac{11}{16}$	
$\frac{23}{16}$	4.50	$8\frac{1}{2}$	$4\frac{5}{8}$	
$\frac{25}{16}$	4.50	$8\frac{1}{2}$	$4\frac{5}{8}$	
$\frac{27}{16}$	4.70	$8\frac{3}{4}$	$4\frac{7}{8}$	No. 2.
$\frac{29}{16}$	4.70	$8\frac{3}{4}$	$4\frac{7}{8}$	
$\frac{31}{16}$	4.80	9	$5\frac{1}{8}$	
$\frac{33}{16}$	4.80	9	$5\frac{1}{8}$	
$\frac{35}{16}$	4.95	$9\frac{1}{4}$	$5\frac{3}{8}$	
$\frac{37}{16}$	4.95	$9\frac{1}{4}$	$5\frac{3}{8}$	
$\frac{39}{16}$	5.10	$9\frac{1}{2}$	$5\frac{5}{8}$	
$\frac{41}{16}$	5.10	$9\frac{1}{2}$	$5\frac{5}{8}$	
$\frac{43}{16}$	5.20	$9\frac{3}{4}$	$5\frac{7}{8}$	
$\frac{45}{16}$	5.20	$9\frac{3}{4}$	$5\frac{7}{8}$	
$\frac{47}{16}$	5.35	$9\frac{7}{8}$	6	
$\frac{49}{16}$	5.35	$9\frac{7}{8}$	6	

These drills have holes through the solid metal and have great advantages over any other drill devised for conveying lubricants as well as air to the point. Air is sometimes used for blowing out chips and keeping the drill cool.

\*These drills  $\frac{3}{4}$  and smaller are furnished with one oil hole only. They can be furnished with two if ordered, but at customer's risk.

For Sockets for these oil drills see page 8.

For information in regard to manner of use see page 117.

# No. 102 C. PATENT CONSTANT ANGLE TWIST DRILLS

WITH MORSE TAPER SHANKS,  
AND HOLES THROUGH SOLID METAL FOR LUBRICANT.



Diameter, Inches.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.	Morse Taper Shank.
$\frac{51}{64}$	\$5.50	10	$6\frac{1}{8}$	No. 2.
$\frac{13}{16}$	5.50	10	$6\frac{1}{8}$	
$\frac{53}{64}$	5.70	$10\frac{1}{4}$	$6\frac{3}{8}$	
$\frac{37}{32}$	5.70	$10\frac{1}{4}$	$6\frac{3}{8}$	
$\frac{55}{64}$	5.90	$10\frac{1}{2}$	$6\frac{5}{8}$	
$\frac{7}{8}$	5.90	$10\frac{1}{2}$	$6\frac{5}{8}$	
$\frac{57}{64}$	6.05	$10\frac{5}{8}$	$6\frac{3}{4}$	
$\frac{29}{32}$	6.05	$10\frac{5}{8}$	$6\frac{3}{4}$	
$\frac{59}{64}$	6.20	$10\frac{3}{4}$	$6\frac{1}{8}$	
$\frac{15}{16}$	6.20	$10\frac{3}{4}$	$6\frac{1}{8}$	
$\frac{61}{64}$	6.35	$10\frac{7}{8}$	$6\frac{1}{4}$	No. 3.
$\frac{31}{32}$	6.35	$10\frac{7}{8}$	$6\frac{1}{4}$	
$\frac{63}{64}$	6.50	11	$6\frac{3}{8}$	
1	6.50	11	$6\frac{3}{8}$	
$1\frac{1}{64}$	6.80	$11\frac{1}{8}$	$6\frac{1}{2}$	
$1\frac{1}{32}$	6.80	$11\frac{1}{8}$	$6\frac{1}{2}$	
$1\frac{3}{64}$	7.10	$11\frac{1}{4}$	$6\frac{5}{8}$	
$1\frac{1}{16}$	7.10	$11\frac{1}{4}$	$6\frac{5}{8}$	
$1\frac{5}{64}$	7.45	$11\frac{1}{2}$	$6\frac{7}{8}$	
$1\frac{3}{32}$	7.45	$11\frac{1}{2}$	$6\frac{7}{8}$	
$1\frac{7}{64}$	7.80	$11\frac{3}{4}$	$7\frac{1}{8}$	
$1\frac{1}{8}$	7.80	$11\frac{3}{4}$	$7\frac{1}{8}$	
$1\frac{9}{64}$	8.00	$11\frac{7}{8}$	$7\frac{1}{4}$	
$1\frac{5}{32}$	8.00	$11\frac{7}{8}$	$7\frac{1}{4}$	
$1\frac{11}{64}$	8.20	12	$7\frac{3}{8}$	
$1\frac{3}{16}$	8.20	12	$7\frac{3}{8}$	

These drills have holes through the solid metal and have great advantages over any other drill devised for conveying lubricants as well as air to the point. Air is sometimes used for blowing out the chips and keeping the drill cool.

For Sockets for these oil drills see page 8.

For information in regard to manner of use see page 117.

**No. 102 C.**  
**PATENT CONSTANT ANGLE TWIST DRILLS**  
 WITH MORSE TAPER SHANKS,  
 AND HOLES THROUGH SOLID METAL FOR LUBRICANT.



Diameter, Inches.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.	Morse Taper Shank.
$1\frac{1}{64}$	\$8.40	$12\frac{1}{8}$	$7\frac{1}{2}$	No. 3.
$1\frac{1}{32}$	8.40	$12\frac{1}{8}$	$7\frac{1}{2}$	
$1\frac{1}{16}$	8.70	$12\frac{1}{2}$	$7\frac{7}{8}$	
$1\frac{1}{4}$	8.70	$12\frac{1}{2}$	$7\frac{7}{8}$	
$1\frac{1}{8}$	9.40	$14\frac{1}{8}$	$8\frac{1}{2}$	
$1\frac{3}{16}$	9.40	$14\frac{1}{8}$	$8\frac{1}{2}$	
$1\frac{1}{2}$	10.15	$14\frac{1}{4}$	$8\frac{5}{8}$	
$1\frac{5}{8}$	10.15	$14\frac{1}{4}$	$8\frac{5}{8}$	
$1\frac{3}{4}$	10.95	$14\frac{3}{8}$	$8\frac{3}{4}$	
$1\frac{7}{8}$	10.95	$14\frac{3}{8}$	$8\frac{3}{4}$	
$1\frac{1}{2}$	11.80	$14\frac{1}{2}$	$8\frac{7}{8}$	No. 4.
$1\frac{3}{8}$	11.80	$14\frac{1}{2}$	$8\frac{7}{8}$	
$1\frac{5}{16}$	12.30	$14\frac{5}{8}$	9	
$1\frac{3}{4}$	12.30	$14\frac{5}{8}$	9	
$1\frac{7}{8}$	12.85	$14\frac{3}{4}$	$9\frac{1}{8}$	
$1\frac{1}{2}$	12.85	$14\frac{3}{4}$	$9\frac{1}{8}$	
$1\frac{1}{4}$	13.35	$14\frac{7}{8}$	$9\frac{1}{4}$	
$1\frac{1}{8}$	13.35	$14\frac{7}{8}$	$9\frac{1}{4}$	
$1\frac{1}{16}$	14.00	15	$9\frac{3}{8}$	
$1\frac{1}{2}$	14.00	15	$9\frac{3}{8}$	
$1\frac{3}{4}$	14.20	15	$9\frac{3}{8}$	
$1\frac{1}{4}$	14.20	15	$9\frac{3}{8}$	
$1\frac{3}{8}$	14.40	$15\frac{1}{4}$	$9\frac{5}{8}$	
$1\frac{1}{2}$	14.40	$15\frac{1}{4}$	$9\frac{5}{8}$	
$1\frac{3}{4}$	14.70	$15\frac{1}{4}$	$9\frac{5}{8}$	
$1\frac{1}{2}$	14.70	$15\frac{1}{4}$	$9\frac{5}{8}$	

These drills have holes through the solid metal and have great advantages over any other drill devised for conveying lubricants as well as air to the point. Air is sometimes used for blowing out the chips and keeping the drill cool.

For Sockets for these oil drills see page 8.

For information in regard to manner of use see page 117.



**No. 102 C.**  
**PATENT CONSTANT ANGLE TWIST DRILLS**  
 WITH MORSE TAPER SHANKS,  
 AND HOLES THROUGH SOLID METAL FOR LUBRICANT.



Diameter, Inches.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.	Morse Taper Shank.
$1\frac{3}{8}$	\$15.00	$15\frac{1}{2}$	$9\frac{7}{8}$	} No. 4.
$1\frac{5}{8}$	15.00	$15\frac{1}{2}$	$9\frac{7}{8}$	
$1\frac{1}{4}$	15.35	$15\frac{1}{2}$	$9\frac{7}{8}$	
$1\frac{3}{4}$	15.35	$15\frac{1}{2}$	$9\frac{7}{8}$	
$1\frac{1}{2}$	15.70	$15\frac{3}{4}$	$10\frac{1}{8}$	
$1\frac{1}{8}$	15.70	$15\frac{3}{4}$	$10\frac{1}{8}$	
$1\frac{1}{4}$	16.10	$15\frac{3}{4}$	$10\frac{1}{8}$	
$1\frac{3}{8}$	16.10	$15\frac{3}{4}$	$9\frac{1}{2}$	
$1\frac{1}{2}$	16.50	16	$9\frac{1}{2}$	
$1\frac{3}{4}$	16.50	16	$9\frac{1}{2}$	
$1\frac{1}{8}$	16.75	16	$9\frac{1}{2}$	
$1\frac{3}{8}$	16.75	16	$9\frac{1}{2}$	
$1\frac{1}{4}$	17.00	$16\frac{1}{4}$	$10\frac{3}{8}$	
$1\frac{1}{8}$	17.00	$16\frac{1}{4}$	$10\frac{1}{8}$	
$1\frac{3}{4}$	17.25	$16\frac{1}{4}$	$10\frac{1}{8}$	
$1\frac{1}{2}$	17.25	$16\frac{1}{4}$	$10\frac{1}{8}$	
$1\frac{1}{4}$	17.50	$16\frac{1}{2}$	$10\frac{3}{8}$	
$1\frac{7}{8}$	17.50	$16\frac{1}{2}$	$10\frac{3}{8}$	
$1\frac{1}{4}$	17.85	$16\frac{1}{2}$	$10\frac{3}{8}$	
$1\frac{3}{8}$	17.85	$16\frac{1}{2}$	$10\frac{3}{8}$	
$1\frac{1}{2}$	18.20	$16\frac{1}{2}$	$10\frac{3}{8}$	
$1\frac{1}{8}$	18.20	$16\frac{1}{2}$	$10\frac{1}{4}$	
$1\frac{1}{4}$	18.60	$16\frac{1}{2}$	$10\frac{1}{4}$	
$1\frac{3}{4}$	18.60	$16\frac{1}{2}$	$10\frac{1}{4}$	
$1\frac{1}{2}$	19.00	$16\frac{1}{2}$	$10\frac{1}{4}$	
2	19.00	$16\frac{1}{2}$	$10\frac{1}{4}$	

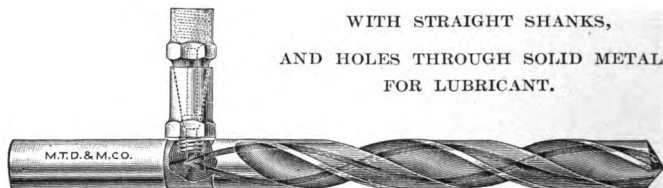
These drills have holes through the solid metal and have great advantages over any other drill devised for conveying lubricants as well as air to the point. Air is sometimes used for blowing out the chips and keeping the drill cool.

For information in regard to manner of use see page 117.

For Sockets for these oil drills see page 8.

For No. 102D, see page 115.

# **No. 104 A.** **PATENT CONSTANT ANGLE TWIST DRILLS**



WITH STRAIGHT SHANKS,  
AND HOLES THROUGH SOLID METAL  
FOR LUBRICANT.

Diam., Inches.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.	Diam., Inches.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.
$\frac{3}{8}$	\$3.00	$6\frac{3}{4}$	$4\frac{1}{4}$	$\frac{3}{16}$	\$5.35	$9\frac{7}{8}$	$6\frac{1}{2}$
$\frac{7}{16}$	3.15	7	$4\frac{3}{8}$	$\frac{5}{16}$	5.50	10	$6\frac{5}{8}$
$\frac{1}{2}$	3.15	7	$4\frac{3}{8}$	$\frac{3}{8}$	5.50	10	$6\frac{5}{8}$
$\frac{9}{16}$	3.30	$7\frac{1}{4}$	$4\frac{5}{8}$	$\frac{7}{16}$	5.70	$10\frac{1}{4}$	$6\frac{3}{4}$
$\frac{5}{8}$	3.30	$7\frac{1}{4}$	$4\frac{5}{8}$	$\frac{1}{2}$	5.70	$10\frac{1}{4}$	$6\frac{3}{4}$
$\frac{11}{16}$	3.85	$7\frac{1}{2}$	$4\frac{7}{8}$	$\frac{5}{8}$	5.90	$10\frac{1}{2}$	7
$\frac{3}{4}$	3.85	$7\frac{1}{2}$	$4\frac{7}{8}$	$\frac{3}{4}$	5.90	$10\frac{1}{2}$	7
$\frac{13}{16}$	4.00	$7\frac{3}{4}$	5	$\frac{7}{8}$	6.05	$10\frac{5}{8}$	7
$\frac{1}{2}$	4.00	$7\frac{3}{4}$	5	$\frac{15}{16}$	6.05	$10\frac{5}{8}$	7
$\frac{3}{4}$	4.15	8	$5\frac{1}{4}$	$\frac{1}{2}$	6.20	$10\frac{3}{4}$	7
$\frac{17}{32}$	4.15	8	$5\frac{1}{4}$	$\frac{1}{16}$	6.20	$10\frac{3}{4}$	7
$\frac{35}{64}$	4.30	$8\frac{1}{4}$	$5\frac{3}{8}$	$\frac{3}{16}$	6.35	$10\frac{7}{8}$	$7\frac{1}{8}$
$\frac{9}{16}$	4.30	$8\frac{1}{4}$	$5\frac{3}{8}$	$\frac{1}{4}$	6.35	$10\frac{7}{8}$	$7\frac{1}{8}$
$\frac{27}{64}$	4.50	$8\frac{1}{2}$	$5\frac{5}{8}$	$\frac{5}{16}$	6.50	11	$7\frac{3}{16}$
$\frac{19}{32}$	4.50	$8\frac{1}{2}$	$5\frac{5}{8}$	1	6.50	11	$7\frac{3}{16}$
$\frac{39}{64}$	4.70	$8\frac{3}{4}$	$5\frac{3}{4}$	$1\frac{1}{16}$	6.80	$11\frac{1}{8}$	$7\frac{5}{16}$
$\frac{5}{8}$	4.70	$8\frac{3}{4}$	$5\frac{3}{4}$	$1\frac{3}{16}$	6.80	$11\frac{1}{8}$	$7\frac{5}{16}$
$\frac{41}{64}$	4.80	9	$5\frac{7}{8}$	$1\frac{5}{16}$	7.10	$11\frac{1}{4}$	$7\frac{3}{8}$
$\frac{21}{32}$	4.80	9	$5\frac{7}{8}$	$1\frac{7}{16}$	7.10	$11\frac{1}{4}$	$7\frac{3}{8}$
$\frac{43}{64}$	4.95	$9\frac{1}{4}$	6	$1\frac{9}{16}$	7.45	$11\frac{1}{2}$	$7\frac{5}{8}$
$\frac{11}{16}$	4.95	$9\frac{1}{4}$	6	$1\frac{3}{8}$	7.45	$11\frac{1}{2}$	$7\frac{5}{8}$
$\frac{45}{64}$	5.10	$9\frac{1}{2}$	$6\frac{1}{8}$	$1\frac{5}{8}$	7.80	$11\frac{3}{4}$	$7\frac{7}{8}$
$\frac{23}{32}$	5.10	$9\frac{1}{2}$	$6\frac{1}{8}$	$1\frac{7}{8}$	7.80	$11\frac{3}{4}$	$7\frac{7}{8}$
$\frac{47}{64}$	5.20	$9\frac{3}{4}$	$6\frac{3}{8}$	$1\frac{9}{8}$	8.00	$11\frac{7}{8}$	8
$\frac{3}{4}$	5.20	$9\frac{3}{4}$	$6\frac{3}{8}$	$1\frac{11}{8}$	8.00	$11\frac{7}{8}$	8
$\frac{49}{64}$	5.35	$9\frac{7}{8}$	$6\frac{1}{2}$	$1\frac{13}{8}$	8.20	12	$8\frac{1}{8}$

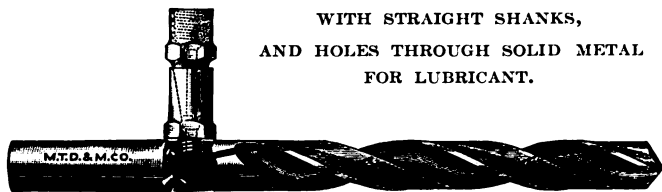
\*These drills  $\frac{3}{16}$  and smaller are furnished with one oil hole only. They can be furnished with two if ordered, but at customers risk.

For information in regard to manner of use see page 117.

## No. 104A.

## PATENT CONSTANT ANGLE TWIST DRILLS

WITH STRAIGHT SHANKS,  
AND HOLES THROUGH SOLID METAL  
FOR LUBRICANT.



Diam., Inches.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.	Diam., Inches.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.
$1\frac{3}{16}$	\$8.20	12	$8\frac{1}{8}$	$1\frac{39}{64}$	\$15.00	$15\frac{1}{2}$	$9\frac{5}{8}$
$1\frac{1}{4}$	8.40	$12\frac{1}{8}$	$8\frac{1}{8}$	$1\frac{5}{8}$	15.00	$15\frac{1}{2}$	$9\frac{5}{8}$
$1\frac{7}{32}$	8.40	$12\frac{1}{8}$	$8\frac{1}{8}$	$1\frac{11}{64}$	15.35	$15\frac{1}{2}$	$9\frac{5}{8}$
$1\frac{13}{64}$	8.70	$12\frac{1}{2}$	$8\frac{1}{2}$	$1\frac{13}{32}$	15.35	$15\frac{1}{2}$	$9\frac{5}{8}$
$1\frac{1}{4}$	8.70	$12\frac{1}{2}$	$8\frac{1}{2}$	$1\frac{13}{32}$	15.70	$15\frac{3}{4}$	$9\frac{7}{8}$
$1\frac{17}{64}$	9.40	$14\frac{1}{8}$	$9\frac{1}{8}$	$1\frac{11}{16}$	15.70	$15\frac{3}{4}$	$9\frac{7}{8}$
$1\frac{9}{32}$	9.40	$14\frac{1}{8}$	$9\frac{1}{8}$	$1\frac{11}{16}$	16.10	$15\frac{3}{4}$	$9\frac{7}{8}$
$1\frac{19}{64}$	10.15	$14\frac{1}{4}$	$9\frac{1}{4}$	$1\frac{33}{64}$	16.10	$15\frac{3}{4}$	$9\frac{7}{8}$
$1\frac{5}{16}$	10.15	$14\frac{1}{4}$	$9\frac{1}{4}$	$1\frac{17}{64}$	16.50	16	$10\frac{1}{8}$
$1\frac{21}{64}$	10.95	$14\frac{3}{8}$	$9\frac{3}{8}$	$1\frac{3}{4}$	16.50	16	$10\frac{1}{8}$
$1\frac{11}{32}$	10.95	$14\frac{3}{8}$	$9\frac{3}{8}$	$1\frac{11}{32}$	16.75	16	$10\frac{1}{8}$
$1\frac{23}{64}$	11.80	$14\frac{1}{2}$	$9\frac{1}{2}$	$1\frac{33}{64}$	16.75	16	$10\frac{1}{8}$
$1\frac{3}{8}$	11.80	$14\frac{1}{2}$	$9\frac{1}{2}$	$1\frac{11}{16}$	17.00	$16\frac{1}{4}$	$10\frac{3}{8}$
$1\frac{25}{64}$	12.30	$14\frac{5}{8}$	$9\frac{1}{2}$	$1\frac{13}{16}$	17.00	$16\frac{1}{4}$	$10\frac{3}{8}$
$1\frac{13}{32}$	12.30	$14\frac{5}{8}$	$9\frac{1}{2}$	$1\frac{23}{64}$	17.25	$16\frac{1}{4}$	$10\frac{3}{8}$
$1\frac{27}{64}$	12.85	$14\frac{3}{4}$	$9\frac{5}{8}$	$1\frac{37}{64}$	17.25	$16\frac{1}{4}$	$10\frac{3}{8}$
$1\frac{7}{16}$	12.85	$14\frac{3}{4}$	$9\frac{5}{8}$	$1\frac{55}{64}$	17.50	$16\frac{1}{2}$	$10\frac{5}{8}$
$1\frac{29}{64}$	13.35	$14\frac{7}{8}$	$9\frac{3}{4}$	$1\frac{7}{8}$	17.50	$16\frac{1}{2}$	$10\frac{5}{8}$
$1\frac{15}{32}$	13.35	$14\frac{7}{8}$	$9\frac{3}{4}$	$1\frac{57}{64}$	17.85	$16\frac{1}{2}$	$10\frac{5}{8}$
$1\frac{31}{64}$	14.00	15	$9\frac{7}{8}$	$1\frac{39}{32}$	17.85	$16\frac{1}{2}$	$10\frac{5}{8}$
$1\frac{1}{2}$	14.00	15	$9\frac{7}{8}$	$1\frac{39}{32}$	18.20	$16\frac{1}{2}$	$10\frac{5}{8}$
$1\frac{33}{64}$	14.20	15	$9\frac{1}{8}$	$1\frac{11}{8}$	18.20	$16\frac{1}{2}$	$10\frac{5}{8}$
$1\frac{17}{32}$	14.20	15	$9\frac{1}{8}$	$1\frac{11}{8}$	18.60	$16\frac{1}{2}$	$10\frac{5}{8}$
$1\frac{35}{64}$	14.40	$15\frac{1}{4}$	$9\frac{3}{8}$	$1\frac{31}{32}$	18.60	$16\frac{1}{2}$	$10\frac{5}{8}$
$1\frac{9}{16}$	14.40	$15\frac{1}{4}$	$9\frac{3}{8}$	$1\frac{53}{64}$	19.00	$16\frac{1}{2}$	$10\frac{5}{8}$
$1\frac{37}{64}$	14.70	$15\frac{1}{4}$	$9\frac{3}{8}$	2	19.00	$16\frac{1}{2}$	$10\frac{5}{8}$
$1\frac{39}{64}$	14.70	$15\frac{1}{4}$	$9\frac{3}{8}$				

For information in regard to manner of use see page 117.

**No. 104B.**  
**PATENT CONSTANT ANGLE TWIST DRILLS**  
 WITH STRAIGHT SHANKS,  
 AND HOLES THROUGH SOLID METAL FOR LUBRICANT.



Diam., Inches.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.	Diam., Inches.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.
$\frac{3}{8}$	\$3.00	$6\frac{3}{4}$	$4\frac{1}{4}$	$\frac{25}{32}$	\$5.35	$9\frac{7}{8}$	$6\frac{1}{2}$
$\frac{25}{64}$	3.15	7	$4\frac{3}{8}$	$\frac{5}{16}$	5.50	10	$6\frac{5}{8}$
$\frac{13}{32}$	3.15	7	$4\frac{3}{8}$	$\frac{11}{16}$	5.50	10	$6\frac{5}{8}$
$\frac{27}{64}$	3.30	$7\frac{1}{4}$	$4\frac{5}{8}$	$\frac{53}{64}$	5.70	$10\frac{1}{4}$	$6\frac{3}{4}$
$\frac{7}{8}$	3.30	$7\frac{1}{4}$	$4\frac{5}{8}$	$\frac{27}{32}$	5.70	$10\frac{1}{4}$	$6\frac{3}{4}$
$\frac{29}{64}$	3.85	$7\frac{1}{2}$	$4\frac{7}{8}$	$\frac{55}{64}$	5.90	$10\frac{1}{2}$	7
* $\frac{15}{32}$	3.85	$7\frac{1}{2}$	$4\frac{7}{8}$	$\frac{7}{8}$	5.90	$10\frac{1}{2}$	7
$\frac{31}{64}$	4.00	$7\frac{3}{4}$	5	$\frac{57}{64}$	6.05	$10\frac{5}{8}$	7
$\frac{1}{2}$	4.00	$7\frac{3}{4}$	5	$\frac{29}{32}$	6.05	$10\frac{5}{8}$	7
$\frac{33}{64}$	4.15	8	$5\frac{1}{4}$	$\frac{59}{64}$	6.20	$10\frac{3}{4}$	7
$\frac{17}{32}$	4.15	8	$5\frac{1}{4}$	$\frac{15}{16}$	6.20	$10\frac{3}{4}$	7
$\frac{35}{64}$	4.30	$8\frac{1}{4}$	$5\frac{3}{8}$	$\frac{61}{64}$	6.35	$10\frac{7}{8}$	$7\frac{1}{8}$
$\frac{9}{16}$	4.30	$8\frac{1}{4}$	$5\frac{3}{8}$	$\frac{31}{32}$	6.35	$10\frac{7}{8}$	$7\frac{1}{8}$
$\frac{37}{64}$	4.50	$8\frac{1}{2}$	$5\frac{5}{8}$	$\frac{63}{64}$	6.50	11	$7\frac{3}{16}$
$\frac{19}{32}$	4.50	$8\frac{1}{2}$	$5\frac{5}{8}$	1	6.50	11	$7\frac{3}{16}$
$\frac{39}{64}$	4.70	$8\frac{3}{4}$	$5\frac{3}{4}$	$1\frac{1}{64}$	6.80	$11\frac{1}{8}$	$7\frac{5}{16}$
$\frac{5}{8}$	4.70	$8\frac{3}{4}$	$5\frac{3}{4}$	$1\frac{1}{32}$	6.80	$11\frac{1}{8}$	$7\frac{5}{16}$
$\frac{41}{64}$	4.80	9	$5\frac{7}{8}$	$1\frac{3}{64}$	7.10	$11\frac{1}{4}$	$7\frac{3}{8}$
$\frac{21}{32}$	4.80	9	$5\frac{7}{8}$	$1\frac{1}{16}$	7.10	$11\frac{1}{4}$	$7\frac{3}{8}$
$\frac{43}{64}$	4.95	$9\frac{1}{4}$	6	$1\frac{5}{64}$	7.45	$11\frac{1}{2}$	$7\frac{5}{8}$
$\frac{11}{16}$	4.95	$9\frac{1}{4}$	6	$1\frac{3}{32}$	7.45	$11\frac{1}{2}$	$7\frac{5}{8}$
$\frac{45}{64}$	5.10	$9\frac{1}{2}$	$6\frac{3}{16}$	$1\frac{7}{64}$	7.80	$11\frac{3}{4}$	$7\frac{7}{8}$
$\frac{23}{32}$	5.10	$9\frac{1}{2}$	$6\frac{3}{16}$	$1\frac{1}{8}$	7.80	$11\frac{3}{4}$	$7\frac{7}{8}$
$\frac{47}{64}$	5.20	$9\frac{3}{4}$	$6\frac{3}{8}$	$1\frac{9}{64}$	8.00	$11\frac{7}{8}$	8
$\frac{3}{4}$	5.20	$9\frac{3}{4}$	$6\frac{3}{8}$	$1\frac{5}{32}$	8.00	$11\frac{7}{8}$	8
$\frac{49}{64}$	5.35	$9\frac{7}{8}$	$6\frac{1}{2}$	$1\frac{11}{64}$	8.20	12	$8\frac{1}{8}$

\*These drills  $\frac{15}{32}$  and smaller are furnished with one oil hole only. They can be furnished with two if ordered, but at customer's risk.

These drills have holes through the solid metal and have great advantages over any other drill devised for conveying lubricants as well as air to the point. Air is sometimes used for blowing out the chips and keeping the drill cool.

For information in regard to manner of use see page 116.

**No. 104B.**  
**PATENT CONSTANT ANGLE TWIST DRILLS**  
 WITH STRAIGHT SHANKS,  
 AND HOLES THROUGH SOLID METAL FOR LUBRICANT.



Diam., Inches.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.	Diam., Inches.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.
1 $\frac{3}{16}$	\$8.20	12	8 $\frac{1}{8}$	1 $\frac{3}{8}$	\$15.00	15 $\frac{1}{2}$	10
1 $\frac{1}{4}$	8.40	12 $\frac{1}{8}$	8 $\frac{1}{8}$	1 $\frac{5}{8}$	15.00	15 $\frac{1}{2}$	10
1 $\frac{3}{8}$	8.40	12 $\frac{1}{8}$	8 $\frac{1}{8}$	1 $\frac{7}{8}$	15.35	15 $\frac{1}{2}$	10
1 $\frac{1}{2}$	8.70	12 $\frac{1}{2}$	8 $\frac{1}{2}$	1 $\frac{9}{8}$	15.35	15 $\frac{1}{2}$	10
1 $\frac{3}{4}$	8.70	12 $\frac{1}{2}$	8 $\frac{1}{2}$	1 $\frac{11}{8}$	15.70	15 $\frac{3}{4}$	10 $\frac{1}{4}$
1 $\frac{7}{8}$	9.40	14 $\frac{1}{8}$	9 $\frac{1}{8}$	1 $\frac{13}{8}$	15.70	15 $\frac{3}{4}$	10 $\frac{1}{4}$
1 $\frac{1}{2}$	9.40	14 $\frac{1}{8}$	9 $\frac{1}{8}$	1 $\frac{15}{8}$	16.10	15 $\frac{3}{4}$	10 $\frac{1}{4}$
1 $\frac{3}{4}$	10.15	14 $\frac{1}{4}$	9 $\frac{1}{4}$	1 $\frac{17}{8}$	16.10	15 $\frac{3}{4}$	10 $\frac{1}{4}$
1 $\frac{1}{2}$	10.15	14 $\frac{1}{4}$	9 $\frac{1}{4}$	1 $\frac{19}{8}$	16.50	16	10 $\frac{1}{2}$
1 $\frac{3}{4}$	10.95	14 $\frac{3}{8}$	9 $\frac{3}{8}$	1 $\frac{21}{8}$	16.50	16	10 $\frac{1}{2}$
1 $\frac{1}{2}$	10.95	14 $\frac{3}{8}$	9 $\frac{3}{8}$	1 $\frac{23}{8}$	16.75	16	10 $\frac{1}{2}$
1 $\frac{3}{4}$	11.80	14 $\frac{1}{2}$	9 $\frac{1}{2}$	1 $\frac{25}{8}$	16.75	16	10 $\frac{1}{2}$
1 $\frac{1}{2}$	11.80	14 $\frac{1}{2}$	9 $\frac{1}{2}$	1 $\frac{27}{8}$	17.00	16 $\frac{1}{4}$	10 $\frac{3}{4}$
1 $\frac{3}{4}$	12.30	14 $\frac{5}{8}$	9 $\frac{1}{2}$	1 $\frac{29}{8}$	17.00	16 $\frac{1}{4}$	10 $\frac{3}{4}$
1 $\frac{1}{2}$	12.30	14 $\frac{5}{8}$	9 $\frac{1}{2}$	1 $\frac{31}{8}$	17.25	16 $\frac{1}{4}$	10 $\frac{3}{4}$
1 $\frac{3}{4}$	12.85	14 $\frac{3}{4}$	9 $\frac{5}{8}$	1 $\frac{33}{8}$	17.25	16 $\frac{1}{4}$	10 $\frac{3}{4}$
1 $\frac{1}{2}$	12.85	14 $\frac{3}{4}$	9 $\frac{5}{8}$	1 $\frac{35}{8}$	17.50	16 $\frac{1}{2}$	11
1 $\frac{3}{4}$	13.35	14 $\frac{7}{8}$	9 $\frac{3}{4}$	1 $\frac{37}{8}$	17.50	16 $\frac{1}{2}$	11
1 $\frac{1}{2}$	13.35	14 $\frac{7}{8}$	9 $\frac{3}{4}$	1 $\frac{39}{8}$	17.85	16 $\frac{1}{2}$	11
1 $\frac{3}{4}$	14.00	15	9 $\frac{7}{8}$	1 $\frac{41}{8}$	17.85	16 $\frac{1}{2}$	11
1 $\frac{1}{2}$	14.00	15	9 $\frac{7}{8}$	1 $\frac{43}{8}$	18.20	16 $\frac{1}{2}$	11
1 $\frac{3}{4}$	14.20	15	9 $\frac{1}{2}$	1 $\frac{45}{8}$	18.20	16 $\frac{1}{2}$	11
1 $\frac{1}{2}$	14.20	15	9 $\frac{1}{2}$	1 $\frac{47}{8}$	18.60	16 $\frac{1}{2}$	11
1 $\frac{3}{4}$	14.40	15 $\frac{1}{4}$	9 $\frac{3}{4}$	1 $\frac{49}{8}$	18.60	16 $\frac{1}{2}$	11
1 $\frac{1}{2}$	14.40	15 $\frac{1}{4}$	9 $\frac{3}{4}$	1 $\frac{51}{8}$	19.00	16 $\frac{1}{2}$	11
1 $\frac{3}{4}$	14.70	15 $\frac{1}{4}$	9 $\frac{3}{4}$	2	19.00	16 $\frac{1}{2}$	11
1 $\frac{1}{2}$	14.70	15 $\frac{1}{4}$	9 $\frac{3}{4}$				

These drills have holes through the solid metal and have great advantages over any other drill devised for conveying lubricants as well as air to the point. Air is sometimes used for blowing out the chips and keeping the drill cool.

For information in regard to manner of use see page 116.

For 104 C see page 115.

**No. 104 D.**  
**PATENT CONSTANT ANGLE TWIST DRILLS**  
 WITH STRAIGHT SHANKS,  
 AND HOLES THROUGH SOLID METAL FOR LUBRICANT.



Diameter, Inches.		Price Each.			Twist Cut, Inches.		
		Whole Length, 8½ Inches.	Whole Length, 10½ Inches.	Whole Length, 13 Inches.	Whole Length, 8½ Inches.	Whole Length, 10½ Inches.	Whole Length, 13 Inches.
31 64	1½	\$4.60	\$5.30	\$5.90	5½	7	9¼
33 64	1732	4.60	5.30	6.00	5¼	7	9¼
35 64	1816	4.70	5.40	6.00	5¼	7	9¼
37 64	1932	4.70	5.40	6.10	5¼	7	9¼
39 64	58	4.70	5.40	6.10	5¼	7	9¼
41 64	2132	4.70	5.40	6.20	5¼	7	9¼
43 64	1116	4.80	5.40	6.20	5¼	7	9¼
45 64	2232	4.80	5.40	6.30	5¼	7	9¼
47 64	34	4.80	5.40	6.30	5¼	7	9¼
49 64	2532	4.90	5.50	6.40	5¼	7	9¼
51 64	1116	5.00	5.60	6.50	5¼	7	9¼
53 64	2732	5.00	5.80	6.60	5¼	7	9¼
55 64	78	5.10	5.90	6.80	5¼	7	9¼
57 64	3532	5.20	6.00	6.90	5¼	7	9¼
59 64	1516	5.30	6.10	7.00	5¼	7	9¼
61 64	3132	5.40	6.20	7.10	5¼	7	9¼
63 64	1	5.50	6.30	7.20	5¼	7	9¼
1 64	132	5.60	6.50	7.40	5	6¾	9
1 64	1116	5.80	6.80	7.70	5	6¾	9
1 64	1332	6.00	7.00	7.90	5	6¾	9
1 64	118	6.10	7.20	8.10	5	6¾	9
1 64	1532	6.30	7.40	8.30	5	6¾	9
1 64	1116	6.50	7.60	8.60	5	6¾	9
1 64	1332	6.70	7.80	8.80	5	6¾	9
1 64	114	6.80	7.90	9.00	5	6¾	9

For information in regard to manner of use see page 116.

**No. 104 D.**  
**PATENT CONSTANT ANGLE TWIST DRILLS**  
 WITH STRAIGHT SHANKS,  
 AND HOLES THROUGH SOLID METAL FOR LUBRICANT.



Diameter, Inches.	Price Each.			Twist Cut, Inches.		
	Whole Length, 8½ Inches.	Whole Length, 10½ Inches.	Whole Length, 13 Inches.	Whole Length, 8½ Inches.	Whole Length, 10½ Inches.	Whole Length, 13 Inches.
1¼ 1⅜	\$7.10	\$8.30	\$9.30	5	6¾	9
1¼ 1⅝	7.40	8.60	9.60	5	6¾	9
1¼ 1⅞	7.70	9.00	10.00	5	6¾	9
1¼ 1¾	8.00	9.30	10.30	5	6¾	9
1¼ 1⅔	8.30	9.60	10.70	5	6¾	9
1¼ 1⅕	8.60	9.90	11.20	5	6¾	9
1¼ 1⅓	8.90	10.30	11.50	5	6¾	9
1¼ 1½	9.20	10.50	11.90	5	6¾	9
1¼ 1⅔	9.40	10.70	12.00	4¾	6½	8¾
1¼ 1⅕	9.60	10.90	12.10	4¾	6½	8¾
1¼ 1⅓	9.80	11.00	12.20	4¾	6½	8¾
1¼ 1⅑	10.00	11.20	12.40	4¾	6½	8¾
1¼ 1⅞	10.20	11.40	12.50	4¾	6½	8¾
1¼ 1⅝	10.30	11.50	12.70	4¾	6½	8¾
1¼ 1⅓	10.40	11.60	12.90	4¾	6½	8¾
1¼ 1⅑	10.50	11.80	13.00	4¾	6½	8¾
1¼ 1⅞	10.70	12.00	13.20	4¾	6½	8¾
1¼ 1⅝	10.90	12.20	13.40	4¾	6½	8¾
1¼ 1⅓	11.00	12.40	13.60	4¾	6½	8¾
1¼ 1⅑	11.20	12.50	13.70	4¾	6½	8¾
1¼ 1⅞	11.40	12.70	14.00	4¾	6½	8¾
1¼ 1⅝	11.60	12.90	14.20	4¾	6½	8¾
1¼ 1⅓	11.90	13.10	14.40	4¾	6½	8¾
1¼ 2	12.10	13.30	14.60	4¾	6½	8¾

Drills 1¼ to 2 inches diameter, 8½ inches long, have shanks 1½ inches diameter, 3 inches long.

Drills 1¼ to 2 inches diameter, 10½ inches long, have shanks 1½ inches diameter, 3¼ inches long.

Drills 1¼ to 2 inches diameter, 13 inches long, have shanks 1½ inches diameter, 3½ inches long.

For information in regard to manner of use see page 116.

**No. 104 E.**  
**PATENT CONSTANT ANGLE TWIST DRILLS**  
 WITH STRAIGHT SHANKS  
 FOR SCREW OR CHUCKING MACHINES,  
 AND HOLES THROUGH SOLID METAL FOR LUBRICANT.



SHANKS  $1\frac{1}{4}$  INCHES DIAMETER, 3 INCHES LONG.

Diameter, Inches.	Price Each.		
	Whole Length, 8 1-2 Inches.	Whole Length, 10 1-2 Inches.	Whole Length, 13 Inches.
	Twist Cut, 4 1-2 Inches.	Twist Cut, 6 1-2 Inches.	Twist Cut, 9 Inches.
$\frac{31}{64}$ $\frac{1}{2}$	\$5.80	\$6.80	\$7.80
$\frac{33}{64}$ $\frac{17}{32}$	5.80	6.80	7.80
$\frac{35}{64}$ $\frac{9}{16}$	5.80	6.70	7.70
$\frac{37}{64}$ $\frac{13}{32}$	5.70	6.70	7.70
$\frac{39}{64}$ $\frac{5}{8}$	5.70	6.70	7.60
$\frac{41}{64}$ $\frac{3}{4}$	5.70	6.60	7.60
$\frac{43}{64}$ $\frac{11}{16}$	5.60	6.60	7.50
$\frac{45}{64}$ $\frac{23}{32}$	5.60	6.50	7.50
$\frac{47}{64}$ $\frac{3}{4}$	5.60	6.50	7.40
$\frac{49}{64}$ $\frac{23}{32}$	5.70	6.60	7.40
$\frac{51}{64}$ $\frac{11}{16}$	5.70	6.60	7.50
$\frac{53}{64}$ $\frac{27}{32}$	5.80	6.70	7.50
$\frac{55}{64}$ $\frac{7}{8}$	5.80	6.70	7.60
$\frac{57}{64}$ $\frac{29}{32}$	5.90	6.80	7.60
$\frac{59}{64}$ $\frac{15}{16}$	5.90	6.80	7.70
$\frac{61}{64}$ $\frac{31}{32}$	6.00	6.90	7.80
$\frac{63}{64}$ 1	6.00	6.90	7.90
$1\frac{1}{64}$ $1\frac{1}{32}$	6.10	7.00	8.00
$1\frac{3}{64}$ $1\frac{1}{16}$	6.20	7.10	8.20
$1\frac{5}{64}$ $1\frac{3}{32}$	6.30	7.20	8.40
$1\frac{7}{64}$ $1\frac{1}{8}$	6.40	7.40	8.50
$1\frac{9}{64}$ $1\frac{3}{16}$	6.50	7.50	8.60
$1\frac{11}{64}$ $1\frac{1}{4}$	6.60	7.60	8.80
$1\frac{13}{64}$ $1\frac{1}{2}$	6.70	7.80	8.90
$1\frac{15}{64}$ $1\frac{3}{4}$	6.80	7.90	9.00

For information in regard to manner of use see page 116.



**No. 104 E.**  
**PATENT CONSTANT ANGLE TWIST DRILLS**  
 WITH STRAIGHT SHANKS  
 FOR SCREW OR CHUCKING MACHINES,  
 AND HOLES THROUGH SOLID METAL FOR LUBRICANT.



SHANKS  $1\frac{1}{4}$  INCHES DIAMETER, 3 INCHES LONG.

Diameter, Inches.		Price Each.		
		Whole Length, 8 1-2 Inches.	Whole Length, 10 1-2 Inches.	Whole Length, 13 Inches.
		Twist Cut, 4 1-2 Inches.	Twist Cut, 6 1-2 Inches.	Twist Cut, 9 Inches.
1 <sup>1</sup> / <sub>16</sub>	1 <sup>3</sup> / <sub>8</sub>	\$7.10	\$8.40	\$9.40
1 <sup>1</sup> / <sub>8</sub>	1 <sup>1</sup> / <sub>8</sub>	7.50	8.70	9.80
1 <sup>1</sup> / <sub>4</sub>	1 <sup>1</sup> / <sub>4</sub>	7.80	9.20	10.20
1 <sup>3</sup> / <sub>8</sub>	1 <sup>3</sup> / <sub>8</sub>	8.20	9.60	10.60
1 <sup>1</sup> / <sub>2</sub>	1 <sup>1</sup> / <sub>2</sub>	8.60	9.90	11.00
1 <sup>5</sup> / <sub>8</sub>	1 <sup>7</sup> / <sub>8</sub>	9.00	10.20	11.40
1 <sup>3</sup> / <sub>4</sub>	1 <sup>5</sup> / <sub>4</sub>	9.20	10.50	11.80
1 <sup>7</sup> / <sub>8</sub>	1 <sup>1</sup> / <sub>2</sub>	9.50	10.80	12.20
1 <sup>1</sup> / <sub>2</sub>	1 <sup>3</sup> / <sub>4</sub>	9.70	11.00	12.30
1 <sup>5</sup> / <sub>8</sub>	1 <sup>3</sup> / <sub>8</sub>	9.90	11.20	12.50
1 <sup>3</sup> / <sub>4</sub>	1 <sup>3</sup> / <sub>8</sub>	10.10	11.40	12.60
1 <sup>7</sup> / <sub>8</sub>	1 <sup>5</sup> / <sub>8</sub>	10.40	11.60	12.80
1 <sup>1</sup> / <sub>2</sub>	1 <sup>1</sup> / <sub>4</sub>	10.50	11.80	13.00
1 <sup>1</sup> / <sub>2</sub>	1 <sup>1</sup> / <sub>8</sub>	10.60	12.00	13.20
1 <sup>5</sup> / <sub>8</sub>	1 <sup>3</sup> / <sub>8</sub>	10.80	12.10	13.40
1 <sup>3</sup> / <sub>4</sub>	1 <sup>3</sup> / <sub>4</sub>	11.00	12.30	13.50
1 <sup>1</sup> / <sub>2</sub>	1 <sup>3</sup> / <sub>8</sub>	11.20	12.50	13.70
1 <sup>1</sup> / <sub>2</sub>	1 <sup>1</sup> / <sub>8</sub>	11.40	12.70	13.90
1 <sup>1</sup> / <sub>2</sub>	1 <sup>3</sup> / <sub>4</sub>	11.60	12.90	14.00
1 <sup>5</sup> / <sub>8</sub>	1 <sup>7</sup> / <sub>8</sub>	11.80	13.00	14.20
1 <sup>3</sup> / <sub>4</sub>	1 <sup>3</sup> / <sub>8</sub>	12.00	13.20	14.40
1 <sup>1</sup> / <sub>2</sub>	1 <sup>1</sup> / <sub>8</sub>	12.20	13.40	14.60
1 <sup>1</sup> / <sub>2</sub>	1 <sup>3</sup> / <sub>4</sub>	12.40	13.60	14.80
1 <sup>1</sup> / <sub>2</sub>	2	12.60	13.80	15.00

For information in regard to manner of use see page 116.  
 For No. 104 F. see page 38, 104 G. page 99, 104 H. page 108.

**No. 104 K.****PATENT CONSTANT ANGLE TWIST DRILLS****WITH STRAIGHT SHANKS,****AND HOLES THROUGH SOLID METAL FOR LUBRICANT.****MILLIMETER SIZES.**

Diameter, M. M.	Price Each.			Twist Cut, M. M.		
	Whole Length, 216 M. M.	Whole Length, 267 M. M.	Whole Length, 330 M. M.	Whole Length, 216 M. M.	Whole Length, 267 M. M.	Whole Length, 330 M. M.
13	\$4.60	\$5.30	\$6.00	133	178	235
13½	4.70	5.40	6.00	133	178	235
14	4.70	5.40	6.00	133	178	235
14½	4.70	5.40	6.10	133	178	235
15	4.70	5.40	6.10	133	178	235
15½	4.70	5.40	6.20	133	178	235
16	4.70	5.40	6.20	133	178	235
16½	4.80	5.40	6.20	133	178	235
17	4.80	5.40	6.20	133	178	235
17½	4.80	5.40	6.30	133	178	235
18	4.80	5.40	6.30	133	178	235
18½	4.80	5.40	6.30	133	178	235
19	4.80	5.40	6.30	133	178	235
19½	5.00	5.60	6.50	133	178	235
20	5.00	5.60	6.50	133	178	235
20½	5.00	5.80	6.60	133	178	235
21	5.00	5.80	6.60	133	178	235
21½	5.10	5.90	6.80	133	178	235
22	5.10	5.90	6.80	133	178	235
22½	5.20	6.00	6.90	133	178	235
23	5.20	6.00	6.90	133	178	235
23½	5.40	6.20	7.10	133	178	235
24	5.40	6.20	7.10	133	178	235

For information in regard to manner of use see page 116.

**No. 104 K**  
**PATENT CONSTANT ANGLE TWIST DRILLS**  
 WITH STRAIGHT SHANKS,  
 AND HOLES THROUGH SOLID METAL FOR LUBRICANT.



**MILLIMETER SIZES.**

Diameter, M. M.	Price Each.			Twist Cut, M. M.		
	Whole Length, 216 M. M.	Whole Length, 267 M. M.	Whole Length, 330 M. M.	Whole Length, 216 M. M.	Whole Length, 267 M. M.	Whole Length, 330 M. M.
24½	\$5.50	\$6.30	\$7.20	133	178	235
25	5.50	6.30	7.20	133	178	235
25½	5.60	6.50	7.40	133	178	235
26	5.60	6.50	7.40	127	171	229
26½	5.80	6.80	7.70	127	171	229
27	5.80	6.80	7.70	127	171	229
27½	6.10	7.20	8.10	127	171	229
28	6.10	7.20	8.10	127	171	229
28½	6.30	7.40	8.30	127	171	229
29	6.30	7.40	8.30	127	171	229
29½	6.50	7.60	8.60	127	171	229
30	6.50	7.60	8.60	127	171	229
30½	6.70	7.80	8.80	127	171	229
31	6.70	7.80	8.80	127	171	229
31½	7.10	8.30	9.30	127	171	229
32	7.10	8.30	9.30	127	171	229
32½	7.40	8.60	9.60	127	171	229
33	7.40	8.60	9.60	127	171	229
33½	7.70	9.00	10.00	127	171	229
34	7.70	9.00	10.00	127	171	229
34½	8.00	9.30	10.30	127	171	229
35	8.00	9.30	10.30	127	171	229
35½	8.60	9.90	11.20	127	171	229
36	8.60	9.90	11.20	127	171	229
36½	8.90	10.30	11.50	127	171	229
37	8.90	10.30	11.50	127	171	229
37½	9.20	10.50	11.90	127	171	229

For information in regard to manner of use see page 116.

**No. 104 K.****PATENT CONSTANT ANGLE TWIST DRILLS**

WITH STRAIGHT SHANKS,  
AND HOLES THROUGH SOLID METAL FOR LUBRICANT.

**MILLIMETER SIZES.**

Diameter, M. M.	Price Each.			Twist Cut, M. M.		
	Whole Length, 216 M. M.	Whole Length, 267 M. M.	Whole Length, 330 M. M.	Whole Length, 216 M. M.	Whole Length, 267 M. M.	Whole Length, 330 M. M.
38	\$9.20	\$10.50	\$11.90	127	171	229
38½	9.60	10.90	12.10	121	165	222
39	9.60	10.90	12.10	121	165	222
39½	9.80	11.00	12.20	121	165	222
40	9.80	11.00	12.20	121	165	222
40½	10.00	11.20	12.40	121	165	222
41	10.00	11.20	12.40	121	165	222
41½	10.20	11.40	12.50	121	165	222
42	10.20	11.40	12.50	121	165	222
42½	10.40	11.60	12.90	121	165	222
43	10.40	11.60	12.90	121	165	222
43½	10.50	11.80	13.00	121	165	222
44	10.50	11.80	13.00	121	165	222
44½	10.70	12.00	13.20	121	165	222
45	10.70	12.00	13.20	121	165	222
45½	10.90	12.20	13.40	121	165	222
46	10.90	12.20	13.40	121	165	222
46½	11.20	12.50	13.70	121	165	222
47	11.20	12.50	13.70	121	165	222
47½	11.40	12.70	14.00	121	165	222
48	11.40	12.70	14.00	121	165	222
48½	11.60	12.90	14.20	121	165	222
49	11.60	12.90	14.20	121	165	222
49½	11.90	13.10	14.40	121	165	222
50	11.90	13.10	14.40	121	165	222

Drills 38½ M. M. diameter and larger, 216 M. M. long, have shanks 38 M. M. diameter.  
76 M. M. long.

Drills 38½ M. M. diameter and larger, 267 M. M. long, have shanks 38 M. M. diameter.  
83 M. M. long.

Drills 38½ M. M. diameter and larger, 330 M. M. long, have shanks 38 M. M. diameter.  
89 M. M. long.

For information in regard manner of use see page 116.

**No. 104 L.**  
**PATENT CONSTANT ANGLE TWIST DRILLS**  
 WITH STRAIGHT SHANKS  
 FOR SCREW OR CHUCKING MACHINES,  
 AND HOLES THROUGH SOLID METAL FOR LUBRICANT.



SHANKS 32 M. M. DIAMETER, 76 M. M. LONG.  
 MILLIMETER SIZES.

Diameter M. M.	Price Each.		
	Whole Length, 216 M. M.	Whole Length, 267 M. M.	Whole Length, 330 M. M.
	Twist Cut, 114 M. M.	Twist Cut, 165 M. M.	Twist Cut, 229 M. M.
13	\$5.80	\$6.80	\$7.80
13½	5.80	6.70	7.70
14	5.80	6.70	7.70
14½	5.70	6.70	7.70
15	5.70	6.70	7.70
15½	5.70	6.60	7.60
16	5.70	6.60	7.60
16½	5.60	6.60	7.50
17	5.60	6.60	7.50
17½	5.60	6.50	7.50
18	5.60	6.50	7.50
18½	5.60	6.50	7.40
19	5.60	6.50	7.40
19½	5.70	6.60	7.50
20	5.70	6.60	7.50
20½	5.80	6.70	7.50
21	5.80	6.70	7.50
21½	5.80	6.70	7.60
22	5.80	6.70	7.60
22½	5.90	6.80	7.60
23	5.90	6.80	7.60
23½	6.00	6.90	7.80
24	6.00	6.90	7.80
24½	6.00	6.90	7.90
25	6.00	6.90	7.90

For information in regard to manner of use see page 116.

**No. 104 L.**  
**PATENT CONSTANT ANGLE TWIST DRILLS**  
**WITH STRAIGHT SHANKS**  
**FOR SCREW OR CHUCKING MACHINES,**  
**AND HOLES THROUGH SOLID METAL FOR LUBRICANT.**



**SHANKS 32 M. M. DIAMETER, 76 M. M. LONG.**  
**MILLIMETER SIZES.**

Diameter, M. M.	Price Each.		
	Whole Length, 216 M. M.	Whole Length, 267 M. M.	Whole Length, 330 M. M.
	Twist Cut, 114 M. M.	Twist Cut, 165 M. M.	Twist Cut, 229 M. M.
25 1/2	\$6.10	\$7.00	\$8.00
26	6.10	7.00	8.00
26 1/2	6.20	7.10	8.20
27	6.20	7.10	8.20
27 1/2	6.40	7.40	8.50
28	6.40	7.40	8.50
28 1/2	6.50	7.50	8.60
29	6.50	7.50	8.60
29 1/2	6.60	7.60	8.80
30	6.60	7.60	8.80
30 1/2	6.70	7.80	8.90
31	6.70	7.80	8.90
31 1/2	7.10	8.40	9.40
32	7.10	8.40	9.40
32 1/2	7.50	8.70	9.80
33	7.50	8.70	9.80
33 1/2	7.80	9.20	10.20
34	7.80	9.20	10.20
34 1/2	8.20	9.60	10.60
35	8.20	9.60	10.60
35 1/2	9.00	10.20	11.40
36	9.00	10.20	11.40
36 1/2	9.20	10.50	11.80
37	9.20	10.50	11.80
37 1/2	9.50	10.80	12.20

For information in regard to manner of use see page 116.

**No. 104 L.**  
**PATENT CONSTANT ANGLE TWIST DRILLS**  
 WITH STRAIGHT SHANKS  
 FOR SCREW OR CHUCKING MACHINES,  
 AND HOLES THROUGH SOLID METAL FOR LUBRICANT.



SHANKS 32 M. M. DIAMETER, 76 M. M. LONG.  
 MILLIMETER SIZES.

Diameter M. M.	Price Each.		
	Whole Length, 216 M. M.	Whole Length, 267 M. M.	Whole Length, 330 M. M.
	Twist Cut, 114 M. M.	Twist Cut, 165 M. M.	Twist Cut, 229 M. M.
38	\$9.50	\$10.80	\$12.20
38 1/2	9.90	11.20	12.50
39	9.90	11.20	12.50
39 1/2	10.10	11.40	12.60
40	10.10	11.40	12.60
40 1/2	10.40	11.60	12.80
41	10.40	11.60	12.80
41 1/2	10.50	11.80	13.00
42	10.50	11.80	13.00
42 1/2	10.80	12.10	13.40
43	10.80	12.10	13.40
43 1/2	11.00	12.30	13.50
44	11.00	12.30	13.50
44 1/2	11.20	12.50	13.70
45	11.20	12.50	13.70
45 1/2	11.40	12.70	13.90
46	11.40	12.70	13.90
46 1/2	11.80	13.00	14.20
47	11.80	13.00	14.20
47 1/2	12.00	13.20	14.40
48	12.00	13.20	14.40
48 1/2	12.20	13.40	14.60
49	12.20	13.40	14.60
49 1/2	12.40	13.60	14.80
50	12.40	13.60	14.80

For information in regard to manner of use see page 116.  
 For No. 104 M. see page 43.

## No. 114 D. HOLLOW DRILLS

FOR DEEP DRILLING OR LONG HOLES.



Diameter, Inches.	Price Each.	Whole Length, Inches.	Size of Hole, Inches.	Diameter, Inches.	Price Each.	Whole Length, Inches.	Size of Hole, Inches.
$\frac{5}{8}$	\$3.20	6	$\frac{3}{8}$	$1\frac{7}{8}$	\$8.00	9	$1\frac{1}{8}$
$\frac{11}{16}$	3.40	6	$\frac{3}{8}$	$1\frac{11}{16}$	8.40	9	$1\frac{1}{8}$
$\frac{3}{4}$	3.60	6	$\frac{7}{16}$	2	8.80	9	$1\frac{1}{8}$
$\frac{13}{16}$	3.70	$6\frac{1}{2}$	$\frac{7}{16}$	$2\frac{1}{8}$	9.10	10	$1\frac{1}{4}$
$\frac{7}{8}$	3.80	$6\frac{1}{2}$	$\frac{1}{2}$	$2\frac{1}{8}$	9.40	10	$1\frac{1}{4}$
$\frac{15}{16}$	3.90	$6\frac{1}{2}$	$\frac{1}{2}$	$2\frac{3}{16}$	9.70	10	$1\frac{1}{4}$
1	4.20	7	$\frac{9}{16}$	$2\frac{1}{4}$	10.00	10	$1\frac{3}{8}$
$1\frac{1}{16}$	4.30	7	$\frac{9}{16}$	$2\frac{1}{8}$	10.40	10	$1\frac{3}{8}$
$1\frac{1}{8}$	4.40	7	$\frac{5}{8}$	$2\frac{3}{8}$	10.80	10	$1\frac{3}{8}$
$1\frac{3}{16}$	4.50	7	$\frac{11}{16}$	$2\frac{7}{16}$	11.20	10	$1\frac{3}{8}$
$1\frac{1}{4}$	4.80	$7\frac{1}{2}$	$\frac{3}{4}$	$2\frac{1}{2}$	11.60	10	$1\frac{3}{8}$
$1\frac{5}{16}$	5.00	$7\frac{1}{2}$	$\frac{13}{16}$	$2\frac{9}{16}$	12.00	12	$1\frac{1}{2}$
$1\frac{3}{8}$	5.20	$7\frac{1}{2}$	$\frac{7}{8}$	$2\frac{5}{8}$	12.40	12	$1\frac{1}{2}$
$1\frac{7}{16}$	5.40	$7\frac{1}{2}$	$\frac{7}{8}$	$2\frac{11}{16}$	12.80	12	$1\frac{1}{2}$
$1\frac{1}{2}$	5.80	8	$\frac{15}{16}$	$2\frac{3}{4}$	13.20	12	$1\frac{1}{2}$
$1\frac{9}{16}$	6.10	8	$\frac{15}{16}$	$2\frac{13}{16}$	13.60	12	$1\frac{1}{2}$
$1\frac{5}{8}$	6.40	8	1	$2\frac{7}{8}$	14.00	12	$1\frac{1}{2}$
$1\frac{11}{16}$	6.70	8	1	$2\frac{15}{16}$	14.50	12	$1\frac{1}{2}$
$1\frac{3}{4}$	7.20	9	$1\frac{1}{8}$	3	15.00	12	$1\frac{1}{2}$
$1\frac{13}{16}$	7.60	9	$1\frac{1}{8}$				

The above drills have a hole lengthwise through the shank connecting with the grooves of the drill. The shank can be threaded and fitted to a metal tube of such length as desired.

The lubricant is conveyed to the point of the drill on the outside of tube, as illustrated on page 116, while the hollow tube admits of the passage of oil and chips from the point.

Tubes are made to order and to fit any size of drill. When ordering give diameter of drill and depth of hole to be drilled.

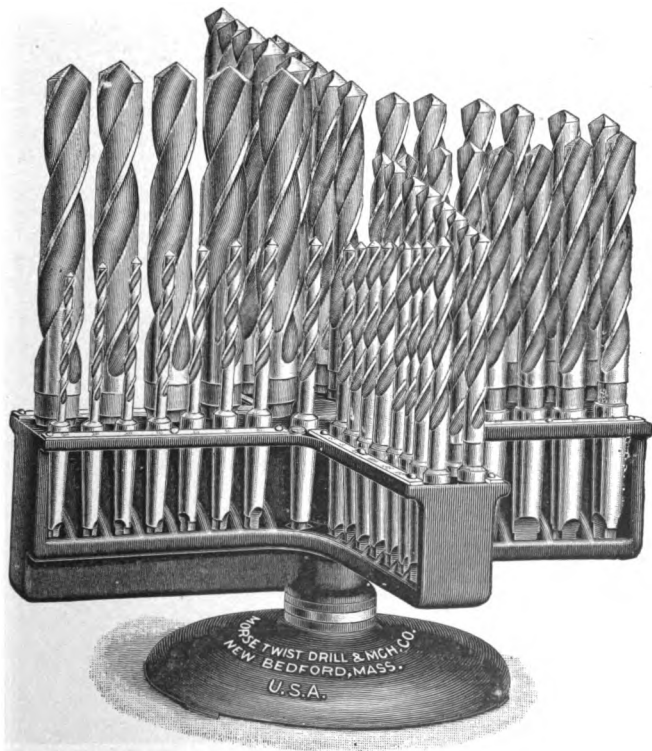
These drills are accurately ground on centers.

In drilling crucible steel the best results are obtained by revolving the work at a speed equalling a periphery speed for the drill of 20 feet per minute and feeding at the rate of .005 inch per revolution. Machinery steel will admit of increased revolution to 40 feet per minute, and a feed of .0035 inch per revolution.

For information as to the use of this drill see page 116.



## REVOLVING DRILL STANDS FOR TAPER SHANK DRILLS.



The Revolving Head in which the Drills are placed is mounted on ball-bearings.

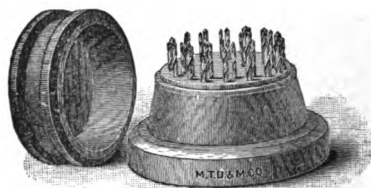
Holds Taper Shank Drills from  $\frac{3}{16}$  to 1 inch by 64ths.

Dimensions of Stand 14 x 14 x 6  $\frac{1}{4}$  inches.

Height including Drills 14 inches.

Set of Drills including Stand . . . . .	\$100.00
Stand without Drills . . . . .	7.50

## JEWELERS' SET OF DRILLS.



No. 10. Jewelers' Set of 36 Drills, No. 30 ( $\frac{1}{8}$  inch) to No. 65

Wire Drill Gauge, mounted in a mahogany case with cap,	\$4.25
Jewelers' Case without Drills,	.75

For list prices see pages 60-61.

## SETS OF TAPER SHANK DRILLS.

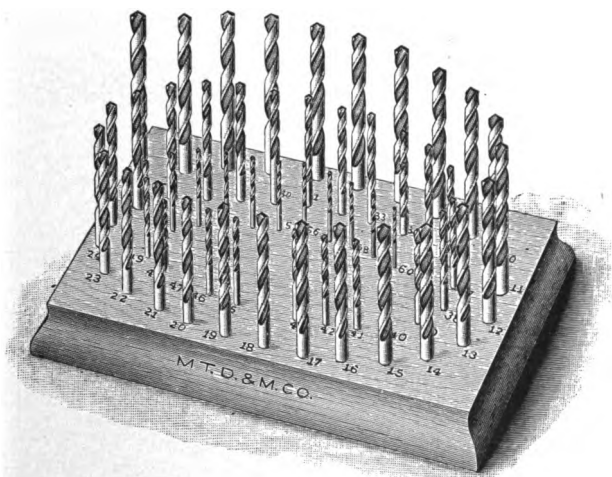


- |         |   |               |
|---------|---|---------------|
| No. 1.  | Set of Taper Shank Drills, $\frac{1}{4}$ to 1 inch varying by 16ths,<br>(see pages 14-16), . . . . .  | \$20.00       |
| No. 2.  | Set of Taper Shank Drills, $\frac{3}{8}$ to $1\frac{1}{4}$ inches varying by 16ths,<br>(see pages 14-16), . . . . .                                       | 34.50         |
| No. 3.  | Set of Taper Shank Drills, $\frac{3}{8}$ to $\frac{3}{4}$ inch by 32nds, $\frac{1}{8}$ to $1\frac{1}{4}$<br>inches by 16ths, (see pages 14-16), . . . . . | 42.00         |
| No. 4.  | Set of Taper Shank Drills,<br>$\frac{3}{8}$ to $\frac{3}{4}$ inch by 32nds, $\frac{1}{8}$ to $1\frac{1}{2}$ inches<br>by 16ths, . . . . .                 | \$64.00       |
|         | $1\frac{9}{16}$ to 2 inches by 16ths, (see pages 14-18), . . . . .  | 67.00 131.00  |
| No. 11. | Set of Taper Shank Drills, $\frac{3}{8}$ to $1\frac{1}{2}$ inches<br>by 32nds, . . . . .  | 109.85        |
|         | $1\frac{1}{2}$ to 2 inches by 32nds, (see pages 14-18), . . . . .   | 132.70 242.55 |

Note.—Prices of Sets of Straight Shank Taper Length Drills will be the same as above list

## SETS OF STRAIGHT SHANK DRILLS.

STYLES NOS. 105, 105A, 106 AND 107.

PRICES OF SETS OF STRAIGHT SHANK DRILLS  
Mounted as above.

No. 5.	Set Drills, Straight Shanks, $\frac{1}{8}$ to $\frac{1}{2}$ inch by 64ths, (see page 50)	\$10.00
No. 6.	Set Drills, Straight Shanks, $\frac{1}{8}$ to $\frac{1}{2}$ inch by 32nds, (see page 50)	5.40
No. 7.	Set Drills, from No. 60 to $\frac{3}{8}$ inch, (65 drills) (see pages 50, 57, and 59)	9.90
No. 8.	Set Drills, Wire Drill Gauge, from No. 1 to 60, (see pages 57-59)	8.10
No. 9.	Half Set Drills, alternate numbers from No. 1 to 59, (see pages 57-59)	4.30
No. 15.	Set Drills, Straight Shanks, A to Z, (see page 56)	10.00
No. 16.	Set Drills, Straight Shanks, No. 1 to 70, (see pages 57-59)	8.85
No. 17.	Set Drills, Straight Shanks, No. 1 to 80, (see pages 57-59)	9.70
No. 18.	Set Drills, Straight Shanks, .5 M.M. to 6 M.M. by $\frac{1}{16}$ M.M. (see pages 51-53)	8.10
No. 19.	Set Drills, Straight Shanks, 1 M.M. to 13 M.M. by $\frac{1}{2}$ M.M. (see pages 51-54)	8.70
	Block without drills for sets, Nos. 5, 6, 7, 8, 9, 15, . . . . .	.35
	Block without drills for sets, Nos. 16, 17, 18, . . . . .	.50
	Block without drills for set No. 19, . . . . .	.45

## SET OF STRAIGHT SHANK MACHINE BITS.

STYLE No. 108



- No. 12. Set Machine Bits,  $\frac{1}{8}$  to  $\frac{1}{2}$  inch, mounted, varying by 32nds, (see page 63) . . . . . \$7.00

## SETS OF BIT STOCK DRILLS.

STYLE No. 109



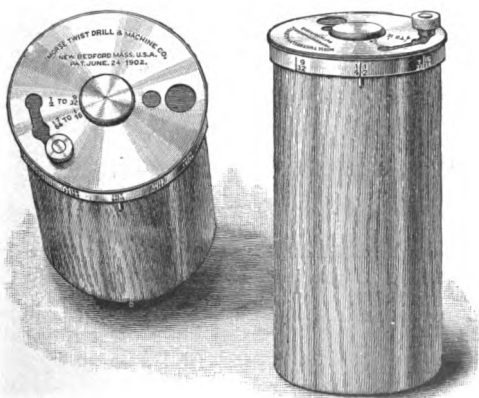
- No. 13. Set Bit Stock Drills,  $\frac{1}{16}$  to  $\frac{1}{4}$  inch by 32nds,  $\frac{5}{16}$  to  $\frac{3}{8}$  inch by 16ths, boxed, (see page 69) . . . . . \$2.60



- No. 14. Set of Bit Stock Drills,  $\frac{1}{16}$ ,  $\frac{3}{32}$ ,  $\frac{1}{8}$ ,  $\frac{5}{32}$ ,  $\frac{3}{16}$ ,  $\frac{7}{32}$ ,  $\frac{1}{4}$ ,  $\frac{5}{16}$ ,  $\frac{3}{8}$  inch, in case, (see page 69) . . . . . \$2.75

## INDEXED CASES WITHOUT DRILLS.

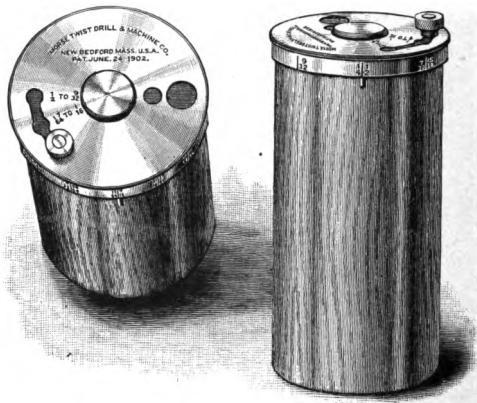
The Drills in Patented Indexed Case, as illustrated below, are contained in holes arranged in concentric circles in the block. Over them is a swinging cover with holes to match each circle. The swinging cover can be moved by the small knob shown so that its holes will register with the holes in the outer cover or cap. Around the edge of the cap are stamped the sizes of the various drills. The cap is turned to bring any size in line with an index mark and by inverting the case the selected drill will drop out.



- |           |   |            |
|-----------|---|------------|
| No. 5 A.  | Holds Straight Shank Drills $\frac{1}{8}$ to $\frac{1}{2}$ inch by 64ths,                                 | . . \$1.25 |
| No. 6 A.  | Holds Straight Shank Drills $\frac{1}{8}$ to $\frac{1}{2}$ inch by 32nds,                                 | . . 1.25   |
| No. 7 A.  | Holds Straight Shank Drills from No. 60 to $\frac{3}{8}$ inch,  | . . 1.25   |
| No. 8 A.  | Holds Wire Gauge Drills from No. 1 to 60,   | . . 1.25   |
| No. 9 A.  | Holds Half Set Drills, alternate numbers from No. 1 to 59,  | 1.25       |
| No. 12 A. | Holds Machine Bits $\frac{1}{8}$ to $\frac{1}{2}$ inch by 32nds,  | . . 1.25   |
| No. 13 A. | Holds Bit Stock Drills $\frac{1}{8}$ to $\frac{1}{4}$ by 32nds, $\frac{5}{16}$ to $\frac{3}{4}$ by 16ths, | 1.25       |

## SETS OF DRILLS IN INDEXED CASES.

### STYLES Nos. 105 AND 107



- |   |                |
|---|----------------|
| No. 5 A. Set Drills, Straight Shanks, $\frac{1}{16}$ to $\frac{1}{2}$ inch by 64ths, (see page 50)            | <b>\$11.50</b> |
| No. 6 A. Set Drills, Straight Shanks, $\frac{1}{16}$ to $\frac{1}{2}$ inch by 32nds, (see page 50), . . . . . | 6.90           |
| No. 7 A. Set Drills, from No. 60 to $\frac{3}{8}$ inch, (see pages 50, 57-59)                                 | 11.40          |
| No. 8 A. Set Drills, Wire Drill Gauge, from No. 1 to 60, (see pages 57-59), . . . . .                         | 9.60           |
| No. 9 A. Half Set Drills, alternate numbers from No. 1 to 59, (see pages 57-59), . . . . .                    | 5.80           |

### STRAIGHT SHANK MACHINE BITS.

STYLE No. 108



- |   |               |
|---|---------------|
| No. 12 A. Set Machine Bits, $\frac{1}{8}$ to $\frac{1}{2}$ inch by 32nds, (see page 63) | <b>\$8.50</b> |
|---|---------------|

### BIT STOCK DRILLS.

STYLE No. 109

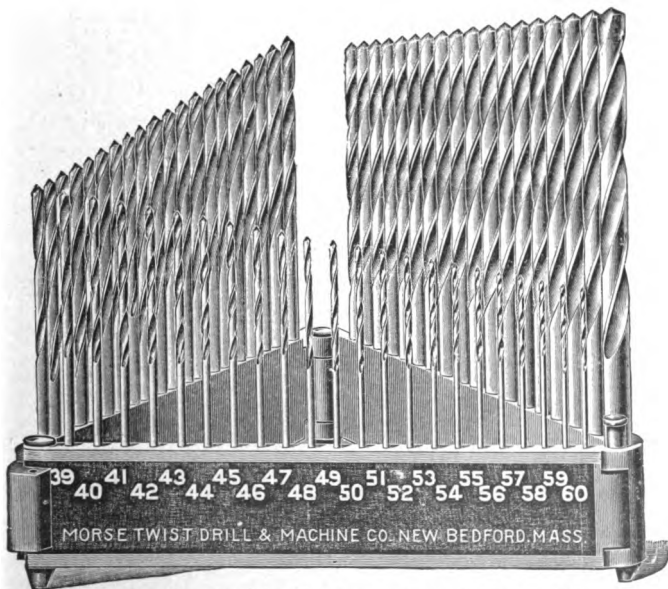
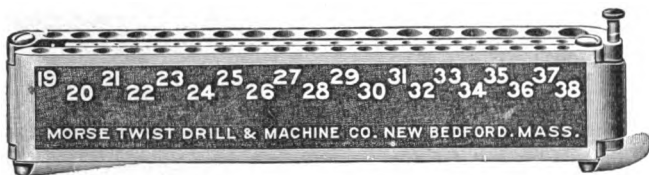


- |  |               |
|--|---------------|
| No. 13 A. Set Bit Stock Drills, $\frac{1}{8}$ to $\frac{1}{4}$ inch by 32nds, $\frac{5}{16}$ to $\frac{3}{8}$ inch by 16ths, (see page 69) . . . . . | <b>\$4.10</b> |
|--|---------------|

## FOLDING OR PORTABLE DRILL HOLDER

FOR STRAIGHT SHANK DRILLS.

STYLES Nos. 105, 105A, 106 AND 107.



- |          |  |         |
|----------|--|---------|
| No. 5B.  | Set Drills, Straight Shanks, $\frac{1}{8}$ to $\frac{1}{2}$ inch by 64ths,<br>(See page 50),   | \$12.50 |
| No. 7B.  | Set Drills, from No. 60 to $\frac{3}{8}$ inch, (see pages 50-59)                               | 12.50   |
| No. 8B.  | Set Drills, Wire Drill Gauge from No. 1 to 60,<br>(See pages 57-59),                           | 9.75    |
| No. 15B. | Set Drills, Straight Shanks A to Z, (see page 56)  | 12.50   |
| No. 18B. | Set Drills, Straight Shanks .5 M. M. to 6 M. M. by<br>$\frac{1}{16}$ M. M., (see pages 51-53), | 9.70    |
| No. 19B. | Set Drills, Straight Shanks 1 M. M. to 13 M. M. by<br>$\frac{1}{2}$ M. M., (see pages 51-54)   | 10.85   |
|          | Holders without Drills, for sets 8B and 18B,   | 1.00    |
|          | Holders without Drills, for sets 5B, 7B, 15B and 19B,  | 1.25    |

**No. 125.****ARBORS FOR BEACH AND STETSON DRILL CHUCKS**

No.	Price Each.	Fitting Chucks	Whole Length, Inches.	Length of Shank, Inches.	Diameter of Shank, Inches.
0	\$ .80	No. 0 Beach .....	$4\frac{3}{8}$	$3\frac{3}{8}$	$\frac{1}{2}$
1	1.00	No. 1 Beach .....	$6\frac{1}{2}$	$4\frac{1}{2}$	$\frac{13}{16}$
2	1.00	{ No. 2 Beach, No. 2 } Stetson & No. 2 } Stetson Geared .. }	$6\frac{1}{2}$	$4\frac{1}{2}$	$\frac{7}{8}$
3	1.20	Nos. 3 & 4 Beach	$6\frac{13}{16}$	$4\frac{1}{2}$	1
4	1.50	Nos. 3 & 4 Stetson	$7\frac{1}{2}$	$4\frac{7}{8}$	$1\frac{1}{4}$

These Arbors have one end blank to be fitted to Lathe Spindle.  
These Arbors fit Chucks illustrated on pages 160 and 161.

**No. 125½.****ARBORS FOR BEACH AND STETSON DRILL CHUCKS**

WITH MORSE TAPER SHANKS.



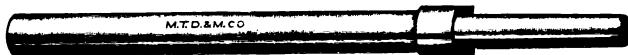
No.	Price Each.	Fitting Chucks.	Whole Length, Inches.	Morse Taper Shank Number.
0	\$1.30	No. 0 Beach .....	$3\frac{5}{8}$	1
1	1.30	No. 1 Beach .....	$4\frac{1}{2}$	1
1A	1.40	No. 1 Beach .....	$5\frac{3}{16}$	2
2	1.40	{ No. 2 Beach, No. 2 Stetson } { & No. 2 Stetson Geared. . . }	$5\frac{3}{16}$	2
2A	1.75	{ No. 2 Beach, No. 2 Stetson } { & No. 2 Stetson Geared. . . }	$5\frac{15}{16}$	3
3	1.75	Nos. 3 & 4 Beach .....	$6\frac{1}{4}$	3
3A	2.25	Nos. 3 & 4 Beach .....	$7\frac{1}{4}$	4
4	2.00	Nos. 3 & 4 Stetson .....	$6\frac{1}{2}$	3
4A	2.50	Nos. 3 & 4 Stetson .....	$7\frac{1}{2}$	4

These Arbors fit Chucks illustrated on pages 160 and 161.  
For Arbor fitting Center Drill Chuck see page 155.



**No. 125 A.****ARBORS**

**FOR SHELL REAMERS NOS. 117, 117½; ROSE SHELL REAMERS NO. 117A  
AND SHELL DRILLS NO. 102 H.**

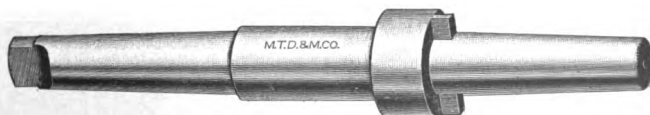


No.	Price Each.	Fitting Sizes, Inches.	Whole Length, Inches.	Length of Shank, Inches.	Diameter of Shank, Inches.
3	\$1.60	1/2 to 9/16	8	5 1/2	7/16
4	1.80	5/8 to 11/16	9	6 3/4	1/2
5	2.00	3/4 to 1 1/16	9 1/2	6 11/16	5/8
6	2.20	1 to 1 1/4	10	6 15/16	3/4
7	2.40	1 5/16 to 1 5/8	11	7 3/16	7/8
8	2.70	1 11/16 to 2	12	7 11/16	1 1/8
9	3.00	2 1/16 to 2 1/2	13	8 7/16	1 3/8
10	3.40	2 9/16 to 3	14	8 27/32	1 5/8
11	5.00	3 1/16 to 3 1/2	15	9 3/16	2
12	7.00	3 9/16 to 4	16	9 15/16	2 1/8
13	9.00	4 1/16 to 4 1/2	17	9 33/32	2 3/8
14	12.00	4 9/16 to 5 1/2	18	10 1/16	2 5/8
15	14.75	5 9/16 to 6 1/2	19	10 9/16	3
16	17.50	6 9/16 to 7	20	11 1/16	3 1/4

Shanks on above arbors are ground standard to sizes listed.

**No. 125½ A.****ARBORS**

**FOR SHELL REAMERS NOS. 117, 117½; ROSE SHELL REAMERS NO. 117A  
AND SHELL DRILLS NO. 102 H.  
WITH MORSE TAPER SHANKS.**



No.	Price Each.	Fitting Sizes, Inches.	Whole Length, Inches.	Morse Taper Shank, No.	No.	Price Each.	Fitting Sizes, Inches.	Whole Length, Inches.	Morse Taper, Shank, No.
3	\$2.60	1/2 to 9/16	8	1	10	\$4.90	2 9/16 to 3	14	4
4	2.80	5/8 to 11/16	9	1	11	6.75	3 1/16 to 3 1/2	15	5
5	3.00	3/4 to 1 1/16	9 1/2	2	12	8.75	3 9/16 to 4	16	5
6	3.20	1 to 1 1/4	10	2	13	10.75	4 1/16 to 4 1/2	17	5
7	3.40	1 5/16 to 1 5/8	11	3	14	14.00	4 9/16 to 5 1/2	18	6
8	3.70	1 11/16 to 2	12	3	15	16.75	5 9/16 to 6 1/2	19	6
9	4.50	2 1/16 to 2 1/2	13	4	16	19.50	6 9/16 to 7	20	6

For Nos. 117, 117½, and 117A see pages 175-178; 102H, 112-113.

**No. 125 B.**  
**ARBORS FOR SHELL END MILLS**  
**WITH MORSE TAPER SHANKS.**



Number.	Price Each.	Fitting Sizes, Inches.	Morse Taper Shank, Number.
1	\$3.75	1 1/4 to 1 1/2	3
2	4.00	1 9/16 to 2 3/16	4
3	4.00	2 1/4 to 3	4

State whether Arbors are desired for Right or Left Hand Mills.  
 These Arbors fit Shell End Mills shown on page 281.

**No. 125 1/2 B.**

Style A.



Style B.



**ARBORS**  
**FOR SHELL**  
**END MILLS**

**WITH BROWN**  
**AND SHARPE**  
**TAPER SHANKS.**

Number.	Price Each.	Fitting Sizes, Inches.	Style of Arbor.	Taper Shank, Number.
1	\$4.50	1 1/4 to 1 1/2	A	7
2	4.50	1 1/4 to 1 1/2	A	9
3	4.50	1 1/4 to 1 1/2	B	9
4	4.50	1 9/16 to 2 3/16	A	9
5	5.25	1 9/16 to 2 3/16	A	10
6	5.50	1 9/16 to 2 3/16	A	11
7	4.50	1 9/16 to 2 3/16	B	9
8	5.25	1 9/16 to 2 3/16	B	10
9	5.50	1 9/16 to 2 3/16	B	11
10	6.00	1 9/16 to 2 3/16	B	12
11	4.75	2 1/4 to 3	A	9
12	5.50	2 1/4 to 3	A	10
13	5.75	2 1/4 to 3	A	11
14	4.75	2 1/4 to 3	B	9
15	5.50	2 1/4 to 3	B	10
16	5.75	2 1/4 to 3	B	11
17	6.25	2 1/4 to 3	B	12

State whether Arbors are desired for Right or Left Hand Mills.  
 These Arbors fit Shell End Mills shown on page 281.

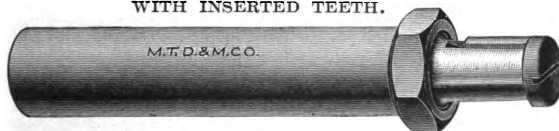


### No. 125 C. ARBORS WITH BLANK ENDS

WITH MORSE TAPER  
SHANKS.

Morse Taper Shank, Number.	Price Each.	Whole Length, Inches.	Length of Blank End, Inches.	Diam. of Blank End, Inches.
1	\$1.50	3 $\frac{1}{8}$	1 $\frac{1}{8}$	$\frac{1}{8}$
2	1.50	4 $\frac{3}{8}$	1 $\frac{1}{4}$	1
3	1.75	5 $\frac{3}{8}$	1 $\frac{1}{2}$	1
4	1.75	6 $\frac{5}{8}$	1 $\frac{3}{4}$	1 $\frac{3}{8}$
5	2.00	8 $\frac{3}{8}$	2 $\frac{1}{4}$	1 $\frac{5}{8}$

### No. 125 D. ARBORS FOR FACE MILLING CUTTERS WITH INSERTED TEETH.



No.	Price Each.	No. of Taper For Mill.	Whole Length, Inches.	Length of Shank, Inches.	Diameter of Shank, Inches.
1	\$7.50	10	10 $\frac{3}{8}$	7 $\frac{7}{8}$	1 $\frac{5}{8}$
2	10.00	12	11 $\frac{7}{8}$	8 $\frac{3}{8}$	2 $\frac{1}{8}$

These Arbors fit Cutters shown on page 286.

These Arbors have one end blank to be fitted to Milling Machine Spindle.  
For 125 E, and 125 F. see page 156.

### No. 125 G. ARBOR FOR CENTER DRILL CHUCKS



This Arbor fits Center Drill Chucks illustrated on page 162.

Price Each.	Whole Length, Inches.	Length of Shank, Inches.	Diameter of Shank, Inches.
.80	4 $\frac{3}{4}$	3 $\frac{1}{2}$	$\frac{1}{8}$

These Arbors have one end blank to be fitted to Lathe Spindle.

**No. 125 E.**  
**ARBORS FOR EXPANDING AND ADJUSTABLE**  
**SHELL REAMERS.**



No.	Price Each.	Fitting Sizes, Inches.	Whole Length, Inches.	Morse Taper End, Number.	Length of Shank, Inches.	Diameter of Shank, Inches.
3	\$3.25	1 $\frac{3}{8}$ to 1 $\frac{5}{8}$	8 $\frac{15}{16}$	2	5 $\frac{1}{2}$	$\frac{7}{8}$
4	4.00	1 $\frac{11}{16}$ to 2 $\frac{1}{4}$	10 $\frac{1}{16}$	3	5 $\frac{3}{4}$	1 $\frac{1}{8}$
5	6.00	2 $\frac{1}{8}$ to 3 $\frac{5}{16}$	11 $\frac{7}{8}$	4	6 $\frac{3}{4}$	1 $\frac{3}{8}$
6	12.50	3 $\frac{3}{8}$ to 4 $\frac{3}{8}$	14 $\frac{3}{8}$	5	7 $\frac{3}{4}$	2
7	17.50	4 $\frac{1}{2}$ to 6	17 $\frac{1}{2}$	6	9 $\frac{1}{2}$	2 $\frac{5}{8}$

Shanks on above Arbors are ground standard to sizes listed.  
 These Arbors fit Reamers illustrated on pages 235, 236 and 238.

**No. 125 F.**  
**ARBORS FOR EXPANDING AND ADJUSTABLE**  
**SHELL REAMERS,**  
**WITH MORSE TAPER SHANKS.**



No.	Price Each.	Fitting Sizes, Inches.	Whole Length, Inches.	Morse Taper End, Number.	Morse Taper Shank, Number.
3	\$4.75	1 $\frac{3}{8}$ to 1 $\frac{5}{8}$	8 $\frac{15}{16}$	2	3
4	5.50	1 $\frac{11}{16}$ to 2 $\frac{1}{4}$	10 $\frac{1}{16}$	3	3
5	7.75	2 $\frac{1}{8}$ to 3 $\frac{5}{16}$	11 $\frac{7}{8}$	4	4
6	14.50	3 $\frac{3}{8}$ to 4 $\frac{3}{8}$	14 $\frac{3}{8}$	5	5
7	19.50	4 $\frac{1}{2}$ to 6	17 $\frac{1}{2}$	6	6

These Arbors fit Reamers illustrated on pages 235, 236 and 238.  
 For No. 125 G see Page 155.

**No. 125 H.**



Above illustration shows method which can be followed to force a Shell Reamer from the Arbor without damage to the Reamer.

**No. 125 J.**  
**ARBORS FOR SCREW SLOTING CUTTERS.**



Number.	Price Each.	Fitting Holes, Inches.	Whole Length, Inches.
1	\$2.50	$\frac{3}{8}$	6
2	2.50	$\frac{1}{2}$	6
3	2.50	$\frac{5}{8}$	6
4	2.50	$\frac{3}{4}$	6
5	2.50	$\frac{7}{8}$	6
6	2.50	1	6

These Arbors fit Cutters shown on pages 283-284.

**No. 125 K.**  
**FLOATING ARBORS**  
**FITTING SHELL REAMERS AND SHELL DRILLS**  
**WITH STRAIGHT HOLES.**



Number.	Price Each.	Fitting Sizes, Inches.	Whole Length, Inches.	Diameter Bushing, Inches.	Length Bushing, Inches.
1	\$9.00	$1\frac{1}{16}$ to $1\frac{5}{16}$	$13\frac{1}{2}$	$1\frac{1}{2}$	$3\frac{1}{4}$
2	9.00	$1\frac{1}{8}$ to $1\frac{3}{8}$	$13\frac{1}{2}$	$1\frac{3}{4}$	$3\frac{1}{4}$
3	9.00	$1\frac{1}{4}$ to $1\frac{1}{2}$	$13\frac{1}{2}$	2	$3\frac{1}{4}$
4	9.35	$1\frac{3}{8}$ to $1\frac{7}{8}$	$13\frac{1}{2}$	$1\frac{1}{2}$	$3\frac{1}{4}$
5	9.35	$1\frac{3}{8}$ to $1\frac{7}{8}$	$13\frac{1}{2}$	$1\frac{3}{4}$	$3\frac{1}{4}$
6	9.35	$1\frac{3}{8}$ to $1\frac{7}{8}$	$13\frac{1}{2}$	2	$3\frac{1}{4}$
7	9.75	$1\frac{7}{8}$ to $2\frac{1}{8}$	$13\frac{1}{2}$	$1\frac{3}{4}$	$3\frac{1}{4}$
8	9.75	$1\frac{7}{8}$ to $2\frac{1}{8}$	$13\frac{1}{2}$	2	$3\frac{1}{4}$
9	10.10	$2\frac{1}{2}$ to $3\frac{3}{16}$	$13\frac{1}{2}$	2	$3\frac{1}{4}$
10	10.50	$3\frac{1}{4}$ to $3\frac{11}{16}$	$13\frac{1}{2}$	2	$3\frac{1}{4}$
11	10.85	$3\frac{3}{4}$ to $4\frac{3}{16}$	$13\frac{1}{2}$	2	$3\frac{1}{4}$
12	11.25	$4\frac{1}{4}$ to 5	$13\frac{1}{2}$	2	$3\frac{1}{4}$

Fitting Shell Reamers with straight holes shown on page 181.

Fitting Expanding Shell Reamers with straight holes shown on page 237.

Fitting Shell Drills with straight holes shown on page 114.

**No. 125 L.****FLOATING ARBORS**

**FOR SHELL REAMERS NOS. 117 AND 117½; ROSE SHELL REAMERS NO. 117A  
AND SHELL DRILLS NO. 102H.**

**WITH TAPER HOLES.**



Number.	Price Each.	Fitting Sizes, Inches.	Whole Length, Inches.	Diameter Bushing, Inches.	Length Bushing, Inches.
3	\$7.50	½ to ⅝	7½	1	3¼
4	7.50	½ to ⅝	7½	1¼	3¼
5	7.50	½ to ⅝	7½	1½	3¼
6	7.70	⅝ to ⅞	8½	1	3¼
7	7.70	⅝ to ⅞	8½	1¼	3¼
8	7.70	⅝ to ⅞	8½	1½	3¼
9	8.00	¾ to ⅞	9	1¼	3¼
10	8.00	¾ to ⅞	9	1½	3¼
11	9.00	1 to 1¼	11	1½	3¼
12	9.00	1 to 1¼	11	1¾	3¼
13	9.00	1 to 1¼	11	2	3¼
14	9.35	1⅝ to 1⅞	13½	1½	3¼
15	9.35	1⅝ to 1⅞	13½	1¾	3¼
16	9.35	1⅝ to 1⅞	13½	2	3¼
17	9.75	1⅞ to 2	13½	1¾	3¼
18	9.75	1⅞ to 2	13½	2	3¼
19	10.10	2⅞ to 2½	13½	1¾	3¼
20	10.10	2⅞ to 2½	13½	2	3¼
21	10.50	2⅞ to 3	13½	2	3¼
22	10.85	3⅞ to 3½	13½	2	3¼
23	10.85	3⅞ to 4	13½	2	3¼

For Nos. 117, 117½ and 117A see pages 175-178.

For No. 102H see pages 112-113.

## No. 125 M. SOLID ARBORS

FITTING SHELL REAMERS AND SHELL DRILLS  
WITH STRAIGHT HOLES.



No.	Price Each.	Fitting Sizes Inches.	Whole Length, Inches.	Diam. Shank, Inches.	No.	Price Each.	Fitting Sizes Inches.	Whole Length, Inches.	Diam. Shank, Inches.
1	\$7.50	1 $\frac{1}{8}$ to 1 $\frac{5}{8}$	11	1 $\frac{1}{4}$	14	\$8.65	2 $\frac{1}{2}$ to 3 $\frac{3}{16}$	11	1 $\frac{1}{2}$
2	7.50	1 $\frac{1}{8}$ to 1 $\frac{5}{8}$	11	1 $\frac{1}{2}$	15	8.65	2 $\frac{1}{2}$ to 3 $\frac{3}{16}$	13 $\frac{1}{2}$	1 $\frac{3}{4}$
3	7.50	1 $\frac{1}{8}$ to 1 $\frac{5}{8}$	13 $\frac{1}{2}$	1 $\frac{3}{4}$	16	8.65	2 $\frac{1}{2}$ to 3 $\frac{3}{16}$	13 $\frac{1}{2}$	2
4	7.50	1 $\frac{1}{8}$ to 1 $\frac{5}{8}$	13 $\frac{1}{2}$	2	17	9.00	3 $\frac{1}{4}$ to 3 $\frac{11}{16}$	11	1 $\frac{1}{4}$
5	7.90	1 $\frac{3}{8}$ to 1 $\frac{7}{8}$	11	1 $\frac{1}{4}$	18	9.00	3 $\frac{1}{4}$ to 3 $\frac{11}{16}$	11	1 $\frac{1}{2}$
6	7.90	1 $\frac{3}{8}$ to 1 $\frac{7}{8}$	11	1 $\frac{1}{2}$	19	9.00	3 $\frac{1}{4}$ to 3 $\frac{11}{16}$	13 $\frac{1}{2}$	1 $\frac{3}{4}$
7	7.90	1 $\frac{3}{8}$ to 1 $\frac{7}{8}$	13 $\frac{1}{2}$	1 $\frac{3}{4}$	20	9.00	3 $\frac{1}{4}$ to 3 $\frac{11}{16}$	13 $\frac{1}{2}$	2
8	7.90	1 $\frac{3}{8}$ to 1 $\frac{7}{8}$	13 $\frac{1}{2}$	2	21	9.35	3 $\frac{3}{4}$ to 4 $\frac{3}{16}$	11	1 $\frac{1}{2}$
9	8.25	1 $\frac{7}{8}$ to 2 $\frac{1}{8}$	11	1 $\frac{1}{4}$	22	9.35	3 $\frac{3}{4}$ to 4 $\frac{3}{16}$	13 $\frac{1}{2}$	1 $\frac{3}{4}$
10	8.25	1 $\frac{7}{8}$ to 2 $\frac{1}{8}$	11	1 $\frac{1}{2}$	23	9.35	3 $\frac{3}{4}$ to 4 $\frac{3}{16}$	13 $\frac{1}{2}$	2
11	8.25	1 $\frac{7}{8}$ to 2 $\frac{1}{8}$	13 $\frac{1}{2}$	1 $\frac{3}{4}$	24	9.75	4 $\frac{1}{4}$ to 5	11	1 $\frac{1}{2}$
12	8.25	1 $\frac{7}{8}$ to 2 $\frac{1}{8}$	13 $\frac{1}{2}$	2	25	9.75	4 $\frac{1}{4}$ to 5	13 $\frac{1}{2}$	1 $\frac{3}{4}$
13	8.65	2 $\frac{1}{2}$ to 3 $\frac{3}{16}$	11	1 $\frac{1}{4}$	26	9.75	4 $\frac{1}{4}$ to 5	13 $\frac{1}{2}$	2

Shanks on all sizes 3 $\frac{1}{4}$  inches long.

\*See note below.

## No. 125 N. SOLID ARBORS

WITH MORSE TAPER SHANKS  
FITTING SHELL REAMERS AND SHELL DRILLS  
WITH STRAIGHT HOLES



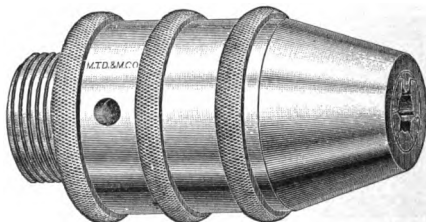
No.	Price Each.	Fitting Sizes Inches.	Whole Length, Inches.	Morse Taper Shank, Number	No.	Price Each.	Fitting Sizes Inches.	Whole Length, Inches.	Morse Taper Shank, Number
1	\$6.75	1 $\frac{1}{8}$ to 1 $\frac{1}{2}$	11 $\frac{7}{8}$	3	5	\$8.25	3 $\frac{1}{4}$ to 3 $\frac{11}{16}$	11 $\frac{13}{16}$	4
2	7.10	1 $\frac{3}{8}$ to 1 $\frac{3}{4}$	11 $\frac{7}{8}$	3	6	9.00	3 $\frac{3}{4}$ to 4 $\frac{3}{16}$	11 $\frac{13}{16}$	4
3	7.50	1 $\frac{7}{8}$ to 2 $\frac{1}{8}$	11 $\frac{7}{8}$	3	7	10.00	4 $\frac{1}{4}$ to 5	13 $\frac{1}{2}$	5
4	7.90	2 $\frac{1}{2}$ to 3 $\frac{3}{16}$	11 $\frac{13}{16}$	4					

\*Both styles of Arbors illustrated above fit Reamers as follows:

Shell Reamers with straight holes shown on page 181;

Expanding Shell Reamers with straight holes shown on page 237;

Shell Drills with straight holes shown on page 114.

**No. 121.****BEACH PATENT DRILL CHUCK.**

	Price Each.
No. 1. Holds from 0 to $\frac{1}{4}$ inch diameter, . . . . .	\$ 8.00
No. 2. Holds from 0 to $\frac{3}{8}$ inch diameter, . . . . .	8.50
No. 3. Holds from $\frac{1}{8}$ to $\frac{1}{2}$ inch diameter, . . . . .	10.00
No. 4. Holds from $\frac{3}{16}$ to $\frac{5}{8}$ inch diameter, . . . . .	11.00

For Arbors fitting these chucks see page 152.

**No. 121.****BEACH CHUCK, No. 0.**

No. 0. Holds from 0 to $\frac{1}{8}$ inch diameter (for jewelers),	Price Each. \$8.00
--	--------------------

**No. 121½.****CHUCK JAWS.**

Price each, not hardened, \$ .25 net.  
 Price per set, not hardened, .75 net.  
 Price per set, hardened, 1.75 net.  
 When ordering jaws to fit old chucks always send chuck so that the jaws can be fitted to it.

**No. 121 A.****WRENCHES FOR BEACH AND STETSON CHUCKS.**

Wrenches are furnished for Beach Chucks Nos. 1, 2, 3, 4, and for Stetson Chuck No. 2. These wrenches are of steel, drop forged, finished and case hardened.



**No. 122.****STETSON PATENT DRILL CHUCK.**

This chuck is strong and of heavy construction. The jaws are controlled by separate drivers and are guided in that part of the chuck which is attached to the driving spindle. This arrangement gives increased strength to the chuck.

The threaded and working parts of the Chuck are covered, and thereby protected from injury and dirt.

Price Each.

No. 2 Holds from 0 to $\frac{3}{8}$ inch diameter, . . . . .	\$8.50
No. 3 Holds from $\frac{1}{8}$ to $\frac{1}{2}$ inch diameter, . . . . .	Price on application.
No. 4 Holds from $\frac{3}{16}$ to $\frac{5}{8}$ inch diameter, . . . . .	Price on application.

These Chucks are so designed that a hole can be drilled through the center if desired.

No. 2 will permit of a hole  $\frac{1}{4}$  inch in diameter.

Nos. 3 and 4 will permit of a hole  $\frac{3}{8}$  inch in diameter.

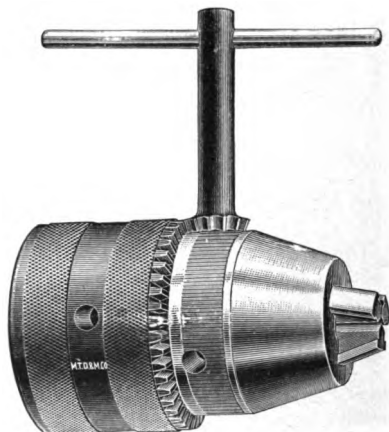
With Chuck No. 2 is furnished a spanner wrench illustrated on page 160.

With Chucks Nos. 3 and 4, instead of a spanner wrench there is furnished a special pin used in tightening and for rapid adjustment.

For Arbors fitting these Chucks, see page 152.

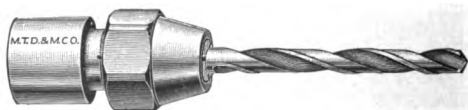
For No. 123 see page 253.

**No. 122 C.**  
**STETSON GEARED CHUCKS.**



**No. 2.** Holds from 0 to  $\frac{3}{8}$  inch diameter . . . Price on application  
For Arbors fitting this Chuck see page 152.

**No. 124.**  
**CENTER DRILL CHUCKS.**



Center Drill Chucks are made of steel, have hardened jaws, and are made in two sizes. Each Chuck will hold but one size of drill—that for which it is especially made. Always specify diameter of drill to be used.

No. 1 Chuck can be made to hold any one size drill from  $\frac{1}{8}$  to  $\frac{3}{8}$  inch. Outside diameter of Chuck is  $\frac{7}{8}$  inch, whole length  $2\frac{1}{8}$  inches.

No. 2 Chuck can be made to hold any one size drill from  $\frac{3}{8}$  to  $\frac{1}{2}$  inch. Outside diameter of Chuck is  $1\frac{1}{8}$  inches, whole length  $2\frac{1}{8}$  inches.

	Price Each
No. 1 Chuck . . . . .	\$2.50
No. 2 Chuck . . . . .	2.50

For Arbor fitting these Chucks see page 155.

For No. 125 see page 152.

## DISCOUNT SHEET

APPLYING TO REAMER SECTION

Pages 163 to 267 Inclusive.

**ARBORS FOR ONE LOCK REAMERS**

No. 125 P. ....

**COUNTERBORES AND COUNTERSINKS**

Nos. 109 A, 109 D, 109 K, 109 L. ....

Nos. 109 B, 109 C. ....

No. 109 1/2 B. ....

No. 109 F. ....

No. 109 J. ....

On application.

**COUNTERBORES IN SETS**

For A. S. M. E. Standard Screws, Page 252. ....

For U. S. Standard Screws, Page 251. ....

**DISKS, STANDARD REFERENCE**

No. 128 B. ....

**GAUGES**

Nos. 127, 127 A, 127 B, 127 C, 127 D, 127 E. ....

No. 128, 1/4 to 3 inches. ....

No. 128, 3 1/8 to 6 inches. ....

No. 128 A. ....

No. 128 A, Sets in Boxes. ....

No. 128 C. ....

**MANDRELS**

No. 123. ....

No. 123 A. ....

**PINS, TAPER**

No. 136 A. ....

**REAMERS****ADJUSTABLE REAMERS**

Nos. 120 E, 120 E-B, 120 1/2 E, 120 N. ....

No. 120 T. ....

No. 500. ....

**BIT STOCK REAMERS**

No. 120 B. ....

DRAMTDC

Continued on next page.

**MORSE TWIST DRILL AND MACHINE CO.**  
**DISCOUNT SHEET.**  
**REAMER SECTION (CONTINUED.)**

<b>CENTER REAMERS</b>	
No. 120 H .....	.....
<b>CHUCKING REAMERS</b>	
Nos. 119, 119 A, 119 B, 119 C, 120, 120½ .....	.....
Nos. 120 F, 120 F-B .....	.....
Nos. 120 F-C, 120 F-E, 120 F-F, 120 F-G .....	.....
No. 120 F-H .....	.....
<b>EXPANDING REAMERS</b>	
Nos. 120 G, 120½ G .....	.....
No. 120 J .....	On application.
Nos. 120 K, 120½ K, 120 M, 120 M-A .....	.....
<b>FLOATING REAMERS</b>	
No. 119 D .....	.....
No. 119 E .....	.....
<b>PIPE REAMERS</b>	See Tap Section.
<b>SETS OF REAMERS</b>	
Bit Stock Reamers, Page 174 .....	.....
Morse Taper Reamers, Page 174 .....	.....
Solid Reamers, Page 174 .....	.....
Taper Pin Reamers, Page 174 .....	.....
<b>SHELL REAMERS</b>	
Nos. 117, 117 A, 117 B, 117 C, 117½, 117½ B .....	.....
See also under Adjustable and Expanding .....	.....
<b>SOLID REAMERS, MACHINE AND HAND</b>	
Nos. 115, 115 A, 115 B, 115 C, 115 D, 115 E, 115 F, 116, 116 A .....	.....
<b>TAPER REAMERS</b>	
Nos. 118, 118½, 118 B, 118½ B, 118 C, 118 D 118½ D, 120 A, 120½ A, 120 C, 120½ C, 120 D, 120 D-A, 120 D-E .....	.....
Nos. 118 A, 118½ A .....	On application.
Nos. 120 B, 120½ B .....	.....
Nos. 120 R, 120 S .....	.....
<b>WRENCHES FOR ADJUSTABLE REAMERS</b>	On Application.

# No. 115.

## JOBBER'S' REAMERS.



Diam. Inches.	Price Each.	Whole Length, Inches.	Length of Flutes, Inches.	Diam. Inches.	Price Each.	Whole Length, Inches.	Length of Flutes, Inches.
$\frac{1}{8}$	\$1.00	3	$1\frac{1}{2}$	$1\frac{11}{32}$	\$5.40	$12\frac{1}{2}$	$6\frac{1}{4}$
$\frac{5}{32}$	1.10	$3\frac{1}{4}$	$1\frac{5}{8}$	$1\frac{3}{8}$	5.60	$12\frac{5}{8}$	$6\frac{5}{8}$
$\frac{3}{16}$	1.20	$3\frac{1}{2}$	$1\frac{3}{4}$	$1\frac{7}{16}$	5.80	$12\frac{5}{8}$	$6\frac{5}{8}$
$\frac{1}{4}$	1.30	$3\frac{3}{4}$	$1\frac{7}{8}$	$1\frac{1}{2}$	6.00	$12\frac{7}{8}$	$6\frac{7}{8}$
$\frac{5}{16}$	1.40	4	2	$1\frac{5}{8}$	6.20	$12\frac{7}{8}$	$6\frac{7}{8}$
$\frac{3}{8}$	1.45	$4\frac{1}{4}$	$2\frac{1}{8}$	$1\frac{1}{2}$	6.40	13	$6\frac{1}{2}$
$\frac{7}{16}$	1.50	$4\frac{1}{2}$	$2\frac{1}{4}$	$1\frac{3}{4}$	6.60	13	$6\frac{1}{2}$
$\frac{1}{2}$	1.55	$4\frac{3}{4}$	$2\frac{3}{8}$	$1\frac{7}{8}$	6.80	13	$6\frac{1}{2}$
$\frac{5}{8}$	1.60	5	$2\frac{1}{2}$	$1\frac{1}{2}$	7.00	13	$6\frac{1}{2}$
$\frac{3}{4}$	1.70	$5\frac{1}{4}$	$2\frac{5}{8}$	$1\frac{5}{8}$	7.20	13	$6\frac{1}{2}$
$\frac{7}{8}$	1.75	$5\frac{1}{2}$	$2\frac{3}{4}$	$1\frac{3}{2}$	7.40	13	$6\frac{1}{2}$
$1$	1.85	$5\frac{3}{4}$	$2\frac{7}{8}$	$1\frac{1}{2}$	7.60	$13\frac{1}{2}$	$6\frac{3}{4}$
$1\frac{1}{8}$	1.90	6	3	$1\frac{3}{4}$	7.80	$13\frac{1}{2}$	$6\frac{3}{4}$
$1\frac{1}{4}$	1.95	$6\frac{1}{4}$	$3\frac{1}{8}$	$1\frac{3}{4}$	8.00	$13\frac{1}{2}$	$6\frac{3}{4}$
$1\frac{1}{2}$	2.00	$6\frac{1}{2}$	$3\frac{1}{4}$	$1\frac{3}{2}$	8.20	$13\frac{1}{2}$	$6\frac{3}{4}$
$1\frac{3}{4}$	2.10	$6\frac{3}{4}$	$3\frac{3}{8}$	$1\frac{3}{2}$	8.40	$13\frac{1}{2}$	$6\frac{3}{4}$
$1\frac{7}{8}$	2.20	7	$3\frac{1}{2}$	$1\frac{3}{2}$	8.60	$13\frac{1}{2}$	$6\frac{3}{4}$
$2$	2.30	$7\frac{3}{8}$	$3\frac{1}{2}$	$1\frac{7}{8}$	8.80	14	7
$2\frac{1}{8}$	2.40	$7\frac{3}{4}$	$3\frac{7}{8}$	$1\frac{3}{2}$	9.00	14	7
$2\frac{1}{4}$	2.50	$8\frac{1}{8}$	$4\frac{1}{8}$	$1\frac{5}{8}$	9.20	14	7
$2\frac{1}{2}$	2.60	$8\frac{3}{8}$	$4\frac{3}{8}$	$1\frac{3}{2}$	9.40	14	7
$2\frac{3}{8}$	2.70	$8\frac{3}{4}$	$4\frac{3}{8}$	2	9.60	14	7
$2\frac{1}{2}$	2.80	$9\frac{1}{8}$	$4\frac{7}{8}$	$2\frac{1}{8}$	10.00	$14\frac{1}{2}$	$7\frac{1}{4}$
$2\frac{7}{8}$	2.95	$9\frac{3}{8}$	$4\frac{1}{2}$	$2\frac{1}{8}$	10.40	$14\frac{1}{2}$	$7\frac{1}{4}$
$3$	3.10	$9\frac{3}{4}$	$4\frac{7}{8}$	$2\frac{3}{8}$	10.80	$14\frac{1}{2}$	$7\frac{1}{4}$
$3\frac{1}{8}$	3.25	10	5	$2\frac{1}{4}$	11.30	$14\frac{1}{2}$	$7\frac{1}{4}$
$3\frac{1}{4}$	3.40	$10\frac{1}{4}$	$5\frac{1}{8}$	$2\frac{5}{8}$	11.80	15	$7\frac{1}{2}$
$3\frac{1}{2}$	3.55	$10\frac{5}{8}$	$5\frac{5}{8}$	$2\frac{3}{8}$	12.30	15	$7\frac{1}{2}$
$3\frac{3}{4}$	3.70	$10\frac{7}{8}$	$5\frac{7}{8}$	$2\frac{7}{8}$	12.80	15	$7\frac{1}{2}$
$4$	3.85	$11\frac{1}{8}$	$5\frac{9}{8}$	$2\frac{1}{2}$	13.40	15	$7\frac{1}{2}$
$4\frac{1}{8}$	4.00	$11\frac{1}{4}$	$5\frac{5}{8}$	$2\frac{3}{8}$	14.00	$15\frac{1}{2}$	$7\frac{3}{4}$
$4\frac{1}{4}$	4.15	$11\frac{1}{2}$	$5\frac{3}{4}$	$2\frac{5}{8}$	14.60	$15\frac{1}{2}$	$7\frac{3}{4}$
$4\frac{1}{2}$	4.30	$11\frac{5}{8}$	$5\frac{1}{2}$	$2\frac{1}{2}$	15.40	$15\frac{1}{2}$	$7\frac{3}{4}$
$4\frac{3}{4}$	4.45	$11\frac{7}{8}$	$5\frac{1}{2}$	$2\frac{3}{4}$	16.20	$15\frac{1}{2}$	$7\frac{3}{4}$
$5$	4.60	12	6	$2\frac{1}{2}$	17.00	16	8
$5\frac{1}{8}$	4.75	$12\frac{1}{8}$	$6\frac{1}{8}$	$2\frac{7}{8}$	17.80	16	8
$5\frac{1}{4}$	4.90	$12\frac{1}{4}$	$6\frac{1}{8}$	$2\frac{1}{2}$	18.60	16	8
$5\frac{1}{2}$	5.05	$12\frac{3}{8}$	$6\frac{3}{8}$	3	19.40	16	8
$5\frac{3}{4}$	5.20	$12\frac{1}{2}$	$6\frac{1}{4}$				

32nd sizes not listed furnished at intermediate prices and 64th sizes at price of next larger 32nd size.

For prices of these Reamers per set, see page 174.

Reamers of any style, size or length, made to order at special prices.

**No. 115A.**  
**JOBBER'S' REAMERS**  
 WITH MORSE TAPER SHANKS.



Diam. Inches.	Price Each.	Whole Length, Inches.	Length of Flutes Inches.	Morse Taper Shank.	Diam. Inches.	Price Each.	Whole Length Inches.	Length of Flutes Inches.	Morse Taper Shank.
$\frac{1}{4}$	\$1.50	$5\frac{3}{16}$	2	No. 1.	$1\frac{3}{8}$	\$5.70	$12\frac{1}{8}$	$6\frac{5}{16}$	No. 4.
$\frac{5}{32}$	1.55	$5\frac{1}{8}$	$2\frac{1}{8}$		$1\frac{1}{2}$	5.90	$12\frac{1}{8}$	$6\frac{5}{16}$	
$\frac{3}{16}$	1.60	$5\frac{1}{2}$	$2\frac{1}{4}$		$1\frac{7}{16}$	6.10	13	$6\frac{7}{16}$	
$\frac{1}{8}$	1.65	$5\frac{5}{8}$	$2\frac{3}{8}$		$1\frac{1}{2}$	6.30	13	$6\frac{7}{16}$	
$\frac{3}{8}$	1.70	$5\frac{11}{16}$	$2\frac{1}{2}$		$1\frac{1}{2}$	6.50	$13\frac{1}{8}$	$6\frac{1}{2}$	
$\frac{7}{16}$	1.80	$5\frac{11}{16}$	$2\frac{5}{8}$		$1\frac{1}{2}$	6.70	$13\frac{1}{8}$	$6\frac{1}{2}$	
$\frac{1}{2}$	1.85	$6\frac{1}{8}$	$2\frac{3}{4}$		$1\frac{1}{8}$	6.90	$13\frac{1}{8}$	$6\frac{1}{2}$	
$\frac{9}{16}$	1.95	$6\frac{1}{4}$	$2\frac{7}{8}$		$1\frac{1}{8}$	7.10	$13\frac{1}{8}$	$6\frac{1}{2}$	
$1\frac{1}{2}$	2.00	$6\frac{1}{8}$	3		$1\frac{5}{8}$	7.30	$13\frac{1}{8}$	$6\frac{1}{2}$	
$\frac{1}{2}$	2.10	$6\frac{1}{8}$	$3\frac{1}{8}$		$1\frac{1}{2}$	7.50	$13\frac{1}{8}$	$6\frac{1}{2}$	
$\frac{1}{8}$	2.15	$6\frac{3}{4}$	$3\frac{1}{4}$		$1\frac{1}{8}$	7.70	$13\frac{7}{8}$	$6\frac{3}{4}$	
$\frac{3}{8}$	2.25	$6\frac{7}{8}$	$3\frac{3}{8}$		$1\frac{1}{2}$	7.85	$13\frac{7}{8}$	$6\frac{3}{4}$	
$\frac{5}{8}$	2.30	$7\frac{1}{8}$	$3\frac{1}{2}$		$1\frac{3}{4}$	8.00	$14\frac{1}{8}$	$6\frac{3}{4}$	
$\frac{1}{2}$	2.40	$7\frac{3}{4}$	$3\frac{1}{2}$		$1\frac{3}{4}$	8.20	$14\frac{1}{8}$	$6\frac{3}{4}$	
$\frac{1}{4}$	2.50	8	$3\frac{7}{8}$		$1\frac{1}{2}$	8.40	$14\frac{1}{8}$	$6\frac{3}{4}$	
$\frac{3}{16}$	2.60	$8\frac{3}{16}$	$4\frac{1}{16}$	No. 2.	$1\frac{1}{2}$	8.60	$14\frac{1}{8}$	$6\frac{3}{4}$	No. 5.
$\frac{1}{8}$	2.70	$8\frac{3}{8}$	$4\frac{3}{16}$		$1\frac{7}{8}$	8.80	15	7	
$\frac{3}{16}$	2.80	$8\frac{1}{8}$	$4\frac{5}{8}$		$1\frac{3}{8}$	9.00	15	7	
$\frac{1}{4}$	2.90	$8\frac{1}{8}$	$4\frac{9}{16}$		$1\frac{1}{2}$	9.20	15	7	
$\frac{1}{8}$	3.05	$8\frac{1}{8}$	$4\frac{1}{4}$		$1\frac{3}{4}$	9.40	15	7	
$\frac{1}{2}$	3.20	$9\frac{1}{8}$	$4\frac{7}{8}$		2	9.60	15	7	
$\frac{3}{8}$	3.35	$9\frac{1}{8}$	5		$2\frac{1}{8}$	10.00	$15\frac{1}{2}$	$7\frac{1}{4}$	
$\frac{1}{2}$	3.50	$10\frac{3}{16}$	$5\frac{1}{8}$		$2\frac{1}{8}$	10.40	$15\frac{1}{2}$	$7\frac{1}{4}$	
$\frac{3}{8}$	3.65	$10\frac{3}{8}$	$5\frac{5}{8}$		$2\frac{3}{8}$	10.80	$15\frac{1}{2}$	$7\frac{1}{4}$	
1	3.80	$10\frac{9}{16}$	$5\frac{7}{8}$		$2\frac{1}{4}$	11.30	$15\frac{1}{2}$	$7\frac{1}{4}$	
$1\frac{1}{32}$	3.95	$10\frac{11}{16}$	$5\frac{9}{16}$		$2\frac{5}{8}$	11.80	16	$7\frac{1}{2}$	
$1\frac{1}{16}$	4.10	$10\frac{13}{16}$	$5\frac{5}{8}$		$2\frac{3}{8}$	12.30	16	$7\frac{1}{2}$	
$1\frac{3}{32}$	4.25	$10\frac{13}{16}$	$5\frac{3}{4}$		$2\frac{7}{8}$	12.80	16	$7\frac{1}{2}$	
$1\frac{1}{8}$	4.40	$11\frac{1}{16}$	$5\frac{1}{2}$		$2\frac{1}{2}$	13.40	16	$7\frac{1}{2}$	
$1\frac{3}{32}$	4.55	$11\frac{1}{16}$	$5\frac{1}{8}$	No. 3.	$2\frac{9}{16}$	14.00	$16\frac{1}{2}$	$7\frac{3}{4}$	
$1\frac{1}{4}$	4.70	$11\frac{1}{8}$	6		$2\frac{5}{8}$	14.60	$16\frac{1}{2}$	$7\frac{3}{4}$	
$1\frac{3}{16}$	4.85	$11\frac{3}{8}$	$6\frac{1}{8}$		$2\frac{1}{2}$	15.40	$16\frac{1}{2}$	$7\frac{3}{4}$	
$1\frac{1}{2}$	5.00	$12\frac{1}{2}$	$6\frac{1}{8}$		$2\frac{3}{4}$	16.20	$16\frac{1}{2}$	$7\frac{3}{4}$	
$1\frac{5}{32}$	5.15	$12\frac{1}{16}$	$6\frac{3}{16}$		$2\frac{1}{2}$	17.00	17	8	
$1\frac{1}{16}$	5.30	$12\frac{1}{8}$	$6\frac{1}{4}$		$2\frac{7}{8}$	17.80	17	8	
$1\frac{1}{8}$	5.50	$12\frac{1}{8}$	$6\frac{1}{4}$		$2\frac{1}{2}$	18.60	17	8	
					3	19.40	17	8	

32nd sizes not listed furnished at intermediate prices and 64th sizes at price of next larger 32nd size.

Flutes are slightly tapered on end.

Reamers of any style, size or length, made to order at special prices.

**No. 115B.**  
**JOBBER'S' REAMERS**  
 WITH SPIRAL FLUTES.



Diam., Inches.	Price Each.	Whole Length, Inches.	Length of Flutes Inches.	Diam., Inches.	Price Each.	Whole Length, Inches.	Length of Flutes Inches.
$\frac{1}{8}$	\$1.00	3	$1\frac{1}{2}$	$\frac{11}{16}$	\$5.40	$12\frac{1}{2}$	$6\frac{1}{4}$
$\frac{3}{16}$	1.10	$3\frac{1}{4}$	$1\frac{5}{8}$	$\frac{13}{16}$	5.60	$12\frac{5}{8}$	$6\frac{5}{16}$
$\frac{7}{16}$	1.20	$3\frac{1}{2}$	$1\frac{3}{4}$	$\frac{1}{2}$	5.80	$12\frac{3}{4}$	$6\frac{1}{2}$
$\frac{1}{2}$	1.30	$3\frac{3}{4}$	$1\frac{7}{8}$	$\frac{11}{16}$	6.00	$12\frac{7}{8}$	$6\frac{7}{16}$
$\frac{5}{8}$	1.40	4	2	$\frac{3}{4}$	6.20	$12\frac{7}{8}$	$6\frac{7}{16}$
$\frac{3}{4}$	1.45	$4\frac{1}{4}$	$2\frac{1}{8}$	$\frac{11}{16}$	6.40	13	$6\frac{1}{2}$
$\frac{7}{8}$	1.50	$4\frac{1}{2}$	$2\frac{1}{4}$	$\frac{13}{16}$	6.60	13	$6\frac{1}{2}$
$\frac{15}{16}$	1.55	$4\frac{3}{4}$	$2\frac{3}{8}$	$\frac{1}{2}$	6.80	13	$6\frac{1}{2}$
1	1.60	5	$2\frac{1}{2}$	$\frac{11}{16}$	7.00	13	$6\frac{1}{2}$
$1\frac{1}{16}$	1.70	$5\frac{1}{4}$	$2\frac{5}{8}$	$\frac{13}{16}$	7.20	13	$6\frac{1}{2}$
$1\frac{1}{8}$	1.75	$5\frac{1}{2}$	$2\frac{3}{4}$	$\frac{1}{2}$	7.40	13	$6\frac{1}{2}$
$1\frac{1}{4}$	1.85	$5\frac{3}{4}$	$2\frac{7}{8}$	$\frac{11}{16}$	7.60	$13\frac{1}{2}$	$6\frac{3}{4}$
$1\frac{3}{8}$	1.90	6	3	$\frac{13}{16}$	7.80	$13\frac{1}{2}$	$6\frac{3}{4}$
$1\frac{1}{2}$	1.95	$6\frac{1}{4}$	$3\frac{1}{8}$	$\frac{1}{2}$	8.00	$13\frac{1}{2}$	$6\frac{3}{4}$
$1\frac{5}{8}$	2.00	$6\frac{1}{2}$	$3\frac{1}{4}$	$\frac{13}{16}$	8.20	$13\frac{1}{2}$	$6\frac{3}{4}$
$1\frac{3}{4}$	2.10	$6\frac{3}{4}$	$3\frac{3}{8}$	$\frac{1}{2}$	8.40	$13\frac{1}{2}$	$6\frac{3}{4}$
$1\frac{7}{8}$	2.20	7	$3\frac{1}{2}$	$\frac{11}{16}$	8.60	$13\frac{1}{2}$	$6\frac{3}{4}$
$2$	2.30	$7\frac{3}{8}$	$3\frac{1}{2}$	$\frac{13}{16}$	8.80	14	7
$2\frac{1}{16}$	2.40	$7\frac{3}{4}$	$3\frac{7}{8}$	$\frac{1}{2}$	9.00	14	7
$2\frac{1}{8}$	2.50	$8\frac{1}{8}$	$4\frac{1}{16}$	$\frac{11}{16}$	9.20	14	7
$2\frac{1}{4}$	2.60	$8\frac{3}{8}$	$4\frac{1}{8}$	$\frac{13}{16}$	9.40	14	7
$2\frac{3}{8}$	2.70	$8\frac{3}{4}$	$4\frac{3}{8}$	2	9.60	14	7
$2\frac{1}{2}$	2.80	$9\frac{1}{8}$	$4\frac{9}{16}$	$2\frac{1}{16}$	10.00	$14\frac{1}{2}$	$7\frac{1}{4}$
$2\frac{5}{8}$	2.95	$9\frac{3}{8}$	$4\frac{11}{16}$	$2\frac{1}{8}$	10.40	$14\frac{1}{2}$	$7\frac{1}{4}$
$2\frac{3}{4}$	3.10	$9\frac{3}{4}$	$4\frac{7}{8}$	$2\frac{3}{16}$	10.80	$14\frac{1}{2}$	$7\frac{1}{4}$
$2\frac{7}{8}$	3.25	10	5	$2\frac{1}{4}$	11.30	$14\frac{1}{2}$	$7\frac{1}{4}$
$3$	3.40	$10\frac{1}{4}$	$5\frac{1}{8}$	$2\frac{5}{16}$	11.80	15	$7\frac{1}{2}$
$3\frac{1}{16}$	3.55	$10\frac{5}{8}$	$5\frac{3}{16}$	$2\frac{3}{8}$	12.30	15	$7\frac{1}{2}$
$3\frac{1}{8}$	3.70	$10\frac{7}{8}$	$5\frac{7}{16}$	$2\frac{1}{2}$	12.80	15	$7\frac{1}{2}$
$3\frac{1}{4}$	3.85	$11\frac{1}{8}$	$5\frac{9}{16}$	$2\frac{1}{2}$	13.40	15	$7\frac{1}{2}$
$3\frac{3}{8}$	4.00	$11\frac{1}{4}$	$5\frac{5}{8}$	$2\frac{9}{16}$	14.00	$15\frac{1}{2}$	$7\frac{3}{4}$
$3\frac{1}{2}$	4.15	$11\frac{1}{2}$	$5\frac{3}{4}$	$2\frac{5}{8}$	14.60	$15\frac{1}{2}$	$7\frac{3}{4}$
$3\frac{5}{8}$	4.30	$11\frac{5}{8}$	$5\frac{13}{16}$	$2\frac{11}{16}$	15.40	$15\frac{1}{2}$	$7\frac{3}{4}$
$3\frac{3}{4}$	4.45	$11\frac{7}{8}$	$5\frac{15}{8}$	$2\frac{3}{4}$	16.20	$15\frac{1}{2}$	$7\frac{3}{4}$
$3\frac{7}{8}$	4.60	12	6	$2\frac{13}{16}$	17.00	16	8
$4$	4.75	$12\frac{1}{8}$	$6\frac{1}{16}$	$2\frac{7}{8}$	17.80	16	8
$4\frac{1}{8}$	4.90	$12\frac{1}{4}$	$6\frac{1}{8}$	$2\frac{15}{16}$	18.60	16	8
$4\frac{1}{4}$	5.05	$12\frac{3}{8}$	$6\frac{3}{16}$	3	19.40	16	8
$4\frac{3}{8}$	5.20	$12\frac{1}{2}$	$6\frac{1}{4}$				

32nd sizes not listed furnished at intermediate prices and 64th sizes at price of next larger 32nd size.

Reamers of any style, size or length, made to order at special prices.

For prices of these Reamers per set, see page 174.

**No. 115 C.**  
**JOBBER'S REAMERS.**  
 WITH THREADED ENDS.



Diam., Inches.	Price Each.	Whole Length, Inches.	Length of Flutes Inches.	Diam., Inches.	Price Each.	Whole Length, Inches.	Length of Flutes, Inches.
$\frac{1}{8}$	\$1.00	3	$1\frac{1}{2}$	$\frac{11}{32}$	\$5.40	$12\frac{1}{2}$	$6\frac{1}{4}$
$\frac{5}{32}$	1.10	$3\frac{1}{4}$	$1\frac{5}{8}$	$\frac{1}{8}$	5.60	$12\frac{5}{8}$	$6\frac{5}{16}$
$\frac{3}{16}$	1.20	$3\frac{1}{2}$	$1\frac{3}{4}$	$\frac{13}{32}$	5.80	$12\frac{5}{8}$	$6\frac{5}{16}$
$\frac{7}{32}$	1.30	$3\frac{3}{4}$	$1\frac{7}{8}$	$\frac{1}{4}$	6.00	$12\frac{7}{8}$	$6\frac{7}{16}$
$\frac{1}{4}$	1.40	4	2	$\frac{15}{32}$	6.20	$12\frac{7}{8}$	$6\frac{7}{16}$
$\frac{9}{32}$	1.45	$4\frac{1}{4}$	$2\frac{1}{8}$	$\frac{11}{2}$	6.40	13	$6\frac{1}{2}$
$\frac{5}{16}$	1.50	$4\frac{1}{2}$	$2\frac{1}{4}$	$\frac{13}{16}$	6.60	13	$6\frac{1}{2}$
$\frac{11}{32}$	1.55	$4\frac{3}{4}$	$2\frac{3}{8}$	$\frac{3}{8}$	6.80	13	$6\frac{1}{2}$
$\frac{3}{8}$	1.60	5	$2\frac{1}{2}$	$\frac{13}{16}$	7.00	13	$6\frac{1}{2}$
$\frac{13}{32}$	1.70	$5\frac{1}{4}$	$2\frac{5}{8}$	$\frac{15}{8}$	7.20	13	$6\frac{1}{2}$
$\frac{7}{16}$	1.75	$5\frac{1}{2}$	$2\frac{3}{4}$	$\frac{13}{16}$	7.40	13	$6\frac{1}{2}$
$\frac{15}{32}$	1.85	$5\frac{3}{4}$	$2\frac{7}{8}$	$\frac{11}{16}$	7.60	$13\frac{1}{2}$	$6\frac{3}{4}$
$\frac{1}{2}$	1.90	6	3	$\frac{13}{16}$	7.80	$13\frac{1}{2}$	$6\frac{3}{4}$
$\frac{5}{16}$	1.95	$6\frac{1}{4}$	$3\frac{1}{8}$	$\frac{13}{16}$	8.00	$13\frac{1}{2}$	$6\frac{3}{4}$
$\frac{9}{16}$	2.00	$6\frac{1}{2}$	$3\frac{1}{4}$	$\frac{13}{16}$	8.20	$13\frac{1}{2}$	$6\frac{3}{4}$
$\frac{11}{16}$	2.10	$6\frac{3}{4}$	$3\frac{3}{8}$	$\frac{11}{16}$	8.40	$13\frac{1}{2}$	$6\frac{3}{4}$
$\frac{3}{8}$	2.20	7	$3\frac{1}{2}$	$\frac{127}{32}$	8.60	$13\frac{1}{2}$	$6\frac{3}{4}$
$\frac{13}{16}$	2.30	$7\frac{3}{8}$	$3\frac{1}{2}$	$\frac{17}{8}$	8.80	14	7
$\frac{7}{8}$	2.40	$7\frac{3}{4}$	$3\frac{7}{8}$	$\frac{129}{32}$	9.00	14	7
$\frac{15}{16}$	2.50	$8\frac{1}{8}$	$4\frac{1}{16}$	$\frac{11}{16}$	9.20	14	7
$\frac{1}{8}$	2.60	$8\frac{3}{8}$	$4\frac{3}{16}$	$\frac{131}{32}$	9.40	14	7
$\frac{13}{16}$	2.70	$8\frac{3}{4}$	$4\frac{5}{8}$	2	9.60	14	7
$\frac{3}{8}$	2.80	$9\frac{1}{8}$	$4\frac{9}{16}$	$\frac{21}{16}$	10.00	$14\frac{1}{2}$	$7\frac{1}{4}$
$\frac{15}{16}$	2.95	$9\frac{3}{8}$	$4\frac{11}{16}$	$\frac{21}{8}$	10.40	$14\frac{1}{2}$	$7\frac{1}{4}$
$\frac{1}{4}$	3.10	$9\frac{3}{4}$	$4\frac{7}{8}$	$\frac{23}{16}$	10.80	$14\frac{1}{2}$	$7\frac{1}{4}$
$\frac{5}{8}$	3.25	10	5	$\frac{23}{8}$	11.30	$14\frac{1}{2}$	$7\frac{3}{4}$
$\frac{7}{8}$	3.40	$10\frac{1}{4}$	$5\frac{1}{8}$	$\frac{25}{16}$	11.80	15	$7\frac{1}{2}$
$\frac{15}{16}$	3.55	$10\frac{5}{8}$	$5\frac{5}{16}$	$\frac{23}{8}$	12.30	15	$7\frac{1}{2}$
$\frac{1}{8}$	3.70	$10\frac{7}{8}$	$5\frac{9}{16}$	$\frac{21}{2}$	12.80	15	$7\frac{1}{2}$
$\frac{13}{32}$	3.85	$11\frac{1}{8}$	$5\frac{11}{16}$	$\frac{21}{8}$	13.40	15	$7\frac{1}{2}$
$\frac{11}{16}$	4.00	$11\frac{1}{4}$	$5\frac{5}{8}$	$\frac{21}{4}$	14.00	$15\frac{1}{2}$	$7\frac{3}{4}$
$\frac{3}{8}$	4.15	$11\frac{1}{2}$	$5\frac{3}{4}$	$\frac{25}{8}$	14.60	$15\frac{1}{2}$	$7\frac{3}{4}$
$\frac{15}{16}$	4.30	$11\frac{5}{8}$	$5\frac{13}{16}$	$\frac{27}{8}$	15.40	$15\frac{1}{2}$	$7\frac{3}{4}$
$\frac{1}{4}$	4.45	$11\frac{7}{8}$	$5\frac{15}{16}$	$\frac{23}{4}$	16.20	$15\frac{1}{2}$	$7\frac{3}{4}$
$\frac{5}{8}$	4.60	12	6	$\frac{21}{8}$	17.00	16	8
$\frac{7}{8}$	4.75	$12\frac{1}{8}$	$6\frac{1}{16}$	$\frac{27}{8}$	17.80	16	8
$\frac{15}{16}$	4.90	$12\frac{1}{4}$	$6\frac{1}{8}$	$\frac{21}{4}$	18.60	16	8
$\frac{1}{8}$	5.05	$12\frac{3}{8}$	$6\frac{3}{16}$	3	19.40	16	8
$\frac{13}{32}$	5.20	$12\frac{1}{2}$	$6\frac{1}{4}$				

32nd sizes not listed furnished at intermediate prices and 64th sizes at price of next larger 32nd size.

Reamers of any style, size or length, made to order at special prices.

For prices of these Reamers per set, see page 174.



**No. 115 D.**  
**JOBBER'S' REAMERS WITH SPIRAL FLUTES**  
**AND MORSE TAPER SHANKS.**



Diam., Inches.	Price Each.	Whole Length Inches.	Length of Flutes Inches.	Morse Taper Shank	Diam., Inches.	Price Each.	Whole Length Inches.	Length of Flutes Inches.	Morse Taper Shank
$\frac{1}{4}$	\$1.50	$5\frac{3}{16}$	2	No. 1.	$\frac{1}{8}$	\$5.70	$12\frac{1}{8}$	$6\frac{5}{16}$	No. 4.
$\frac{3}{32}$	1.55	$5\frac{1}{8}$	$2\frac{1}{8}$		$\frac{1}{16}$	5.90	$12\frac{1}{8}$	$6\frac{1}{8}$	
$\frac{1}{8}$	1.60	$5\frac{1}{2}$	$2\frac{1}{4}$		$\frac{1}{8}$	6.10	13	$6\frac{1}{8}$	
$\frac{1}{16}$	1.65	$5\frac{5}{8}$	$2\frac{3}{8}$		$\frac{1}{16}$	6.30	13	$6\frac{1}{8}$	
$\frac{3}{16}$	1.70	$5\frac{1}{2}$	$2\frac{1}{2}$		$\frac{1}{8}$	6.50	$13\frac{1}{8}$	$6\frac{1}{2}$	
$\frac{1}{2}$	1.80	$5\frac{1}{2}$	$2\frac{3}{8}$		$\frac{1}{16}$	6.70	$13\frac{1}{8}$	$6\frac{1}{2}$	
$\frac{5}{16}$	1.85	$6\frac{1}{8}$	$2\frac{3}{4}$		$\frac{1}{8}$	6.90	$13\frac{1}{8}$	$6\frac{1}{2}$	
$\frac{3}{8}$	1.95	$6\frac{1}{4}$	$2\frac{7}{8}$		$\frac{1}{16}$	7.10	$13\frac{1}{8}$	$6\frac{1}{2}$	
$\frac{1}{2}$	2.00	$6\frac{7}{8}$	3		$\frac{1}{8}$	7.30	$13\frac{1}{8}$	$6\frac{1}{2}$	
$\frac{3}{4}$	2.10	$6\frac{7}{8}$	$3\frac{1}{8}$		$\frac{1}{16}$	7.50	$13\frac{1}{8}$	$6\frac{1}{2}$	
$\frac{1}{2}$	2.15	$6\frac{3}{4}$	$3\frac{1}{4}$		$\frac{1}{8}$	7.70	$13\frac{1}{8}$	$6\frac{3}{4}$	
$\frac{3}{4}$	2.25	$6\frac{7}{8}$	$3\frac{3}{8}$		$\frac{1}{16}$	7.85	$13\frac{1}{8}$	$6\frac{3}{4}$	
$\frac{5}{8}$	2.30	$7\frac{1}{8}$	$3\frac{1}{2}$	No. 2.	$\frac{1}{4}$	8.00	$14\frac{1}{8}$	$6\frac{3}{4}$	No. 5.
$\frac{3}{4}$	2.40	$7\frac{3}{4}$	$3\frac{1}{8}$		$\frac{1}{8}$	8.20	$14\frac{1}{8}$	$6\frac{3}{4}$	
$\frac{1}{2}$	2.50	8	$3\frac{3}{8}$		$\frac{1}{16}$	8.40	$14\frac{1}{8}$	$6\frac{3}{4}$	
$\frac{3}{4}$	2.60	$8\frac{3}{8}$	$4\frac{1}{8}$		$\frac{1}{8}$	8.60	$14\frac{1}{8}$	$6\frac{3}{4}$	
$\frac{1}{2}$	2.70	$8\frac{3}{8}$	$4\frac{1}{8}$		$\frac{1}{16}$	8.80	15	7	
$\frac{3}{4}$	2.80	$8\frac{1}{2}$	$4\frac{3}{8}$		$\frac{1}{8}$	9.00	15	7	
$\frac{1}{2}$	2.90	$8\frac{1}{2}$	$4\frac{1}{8}$		$\frac{1}{16}$	9.20	15	7	
$\frac{3}{4}$	3.05	$8\frac{1}{2}$	$4\frac{1}{8}$		$\frac{1}{8}$	9.40	15	7	
$\frac{1}{2}$	3.20	$9\frac{1}{8}$	$4\frac{7}{8}$		$\frac{1}{16}$	9.60	15	7	
$\frac{3}{4}$	3.35	$9\frac{1}{8}$	5		$\frac{1}{8}$	10.00	$15\frac{1}{2}$	$7\frac{1}{4}$	
$\frac{1}{2}$	3.50	$10\frac{3}{8}$	$5\frac{1}{8}$		$\frac{1}{16}$	10.40	$15\frac{1}{2}$	$7\frac{1}{4}$	
$\frac{3}{4}$	3.65	$10\frac{3}{8}$	$5\frac{1}{8}$		$\frac{1}{8}$	10.80	$15\frac{1}{2}$	$7\frac{1}{4}$	
1	3.80	$10\frac{9}{16}$	$5\frac{1}{8}$	No. 3.	$\frac{1}{4}$	11.30	$15\frac{1}{2}$	$7\frac{1}{4}$	No. 5.
$\frac{1}{32}$	3.95	$10\frac{1}{16}$	$5\frac{1}{8}$		$\frac{1}{8}$	11.80	16	$7\frac{1}{2}$	
$\frac{1}{16}$	4.10	$10\frac{1}{16}$	$5\frac{5}{8}$		$\frac{1}{16}$	12.30	16	$7\frac{1}{2}$	
$\frac{1}{8}$	4.25	$10\frac{1}{16}$	$5\frac{3}{4}$		$\frac{1}{8}$	12.80	16	$7\frac{1}{2}$	
$\frac{1}{16}$	4.40	$11\frac{1}{16}$	$5\frac{1}{2}$		$\frac{1}{16}$	13.40	16	$7\frac{1}{2}$	
$\frac{1}{8}$	4.55	$11\frac{3}{16}$	$5\frac{1}{2}$		$\frac{1}{8}$	14.00	$16\frac{1}{2}$	$7\frac{3}{4}$	
$\frac{1}{16}$	4.70	$11\frac{1}{16}$	6		$\frac{1}{16}$	14.60	$16\frac{1}{2}$	$7\frac{3}{4}$	
$\frac{1}{8}$	4.85	$11\frac{3}{8}$	$6\frac{1}{8}$		$\frac{1}{8}$	15.40	$16\frac{1}{2}$	$7\frac{3}{4}$	
$\frac{1}{16}$	5.00	$12\frac{1}{2}$	$6\frac{1}{8}$		$\frac{1}{16}$	16.20	$16\frac{1}{2}$	$7\frac{3}{4}$	
$\frac{1}{8}$	5.15	$12\frac{9}{16}$	$6\frac{3}{8}$		$\frac{1}{8}$	17.00	17	8	
$\frac{1}{16}$	5.30	$12\frac{1}{16}$	$6\frac{1}{4}$		$\frac{1}{16}$	17.80	17	8	
$\frac{1}{8}$	5.50	$12\frac{1}{16}$	$6\frac{1}{4}$		3	18.60	17	8	
				No. 4.		19.40	17	8	

32nd sizes not listed furnished at intermediate prices and 64th sizes at price of next larger 32nd size.

Flutes are slightly tapered on end.

Reamers of any style, size or length, made to order at special prices.

## No. 115E.

## JOBBER'S' REAMERS.

## MILLIMETER SIZES.



Diam., M. M.	Price Each.	Whole Length, M. M.	Length of Flutes M. M.	Diam., M. M.	Price Each.	Whole Length, M. M.	Length of Flutes, M. M.
3	\$1.00	76	38	15	\$2.10	171	86
3½	1.10	83	41	15½	2.20	178	89
4	1.10	83	41	16	2.20	178	89
4½	1.20	89	44	16½	2.30	187	94
5	1.25	95	48	17	2.40	197	98
5½	1.30	95	48	17½	2.40	197	98
6	1.40	102	51	18	2.50	206	103
6½	1.40	102	51	18½	2.60	213	106
7	1.45	108	54	19	2.60	213	106
7½	1.50	114	57	19½	2.70	222	111
8	1.50	114	57	20	2.75	222	111
8½	1.55	121	60	20½	2.80	232	116
9	1.60	127	63	21	2.90	238	119
9½	1.60	127	63	21½	3.00	238	119
10	1.70	133	67	22	3.10	248	124
10½	1.70	133	67	22½	3.20	254	127
11	1.75	140	70	23	3.25	254	127
11½	1.85	146	73	23½	3.35	260	130
12	1.85	146	73	24	3.40	270	135
12½	1.90	152	76	24½	3.55	270	135
13	1.95	159	79	25	3.60	276	138
13½	1.95	159	79	26	3.80	283	141
14	2.00	165	83	27	4.00	286	143
14½	2.10	171	86	28	4.25	295	148

**No. 115E.****JOBBER'S' REAMERS.****MILLIMETER SIZES**

Diam., M. M.	Price Each.	Whole Length, M. M.	Length of Flutes, M. M.	Diam., M. M.	Price Each.	Whole Length, M. M.	Length of Flutes, M. M.
29	\$4.45	302	151	53	\$10.20	368	184
30	4.60	305	152	54	10.40	368	184
31	4.75	308	154	55	10.70	368	184
32	4.90	311	156	56	11.00	368	184
33	5.15	317	159	57	11.30	368	184
34	5.40	317	159	58	11.60	381	190
35	5.60	321	160	59	12.00	381	190
36	5.90	327	164	60	12.30	381	190
37	6.15	327	164	61	12.55	381	190
38	6.40	330	165	62	12.90	381	190
39	6.60	330	165	63	13.30	381	190
40	6.90	330	165	64	13.70	394	197
41	7.20	330	165	65	14.00	394	197
42	7.40	330	165	66	14.30	394	197
43	7.60	343	171	67	14.80	394	197
44	7.90	343	171	68	15.40	394	197
45	8.10	343	171	69	15.80	394	197
46	8.40	343	171	70	16.40	394	197
47	8.60	356	178	71	17.00	406	203
48	8.90	356	178	72	17.40	406	203
49	9.20	356	178	73	17.80	406	203
50	9.40	356	178	74	18.40	406	203
51	9.70	368	184	75	19.00	406	203
52	10.00	368	184	76	19.40	406	203

**No. 115F.****JOBBER'S REAMERS**

WITH THREADED ENDS.

MILLIMETER SIZES.



Diameter, M. M.	Price Each.	Whole Length, M. M.	Length of Flutes, M. M.	Diameter, M. M.	Price Each.	Whole Length, M. M.	Length of Flutes, M. M.
5	\$1.25	95	48	17	\$2.40	197	98
5½	1.30	95	48	17½	2.40	197	98
6	1.40	102	51	18	2.50	206	103
6½	1.40	102	51	18½	2.60	213	106
7	1.45	108	54	19	2.60	213	106
7½	1.50	114	57	19½	2.70	222	111
8	1.50	114	57	20	2.75	222	111
8½	1.55	121	60	20½	2.80	232	116
9	1.60	127	63	21	2.90	238	119
9½	1.60	127	63	21½	3.00	238	119
10	1.70	133	67	22	3.10	248	124
10½	1.70	133	67	22½	3.20	254	127
11	1.75	140	70	23	3.25	254	127
11½	1.85	146	73	23½	3.35	260	130
12	1.85	146	73	24	3.40	270	135
12½	1.90	152	76	24½	3.55	270	135
13	1.95	159	79	25	3.60	276	138
13½	1.95	159	79	26	3.80	283	141
14	2.00	165	83	27	4.00	286	143
14½	2.10	171	86	28	4.25	295	148
15	2.10	171	86	29	4.45	302	151
15½	2.20	178	89	30	4.60	305	152
16	2.20	178	89	31	4.75	308	154
16½	2.30	187	94	32	4.90	311	156

**No. 115 F.****JOBBER'S REAMERS**

WITH THREADED ENDS.

MILLIMETER SIZES.



Diameter, M. M.	Price Each.	Whole Length, M. M.	Length of Flutes, M. M.	Diameter, M. M.	Price Each.	Whole Length, M. M.	Length of Flutes, M. M.
33	\$5.15	317	159	55	\$10.70	368	184
34	5.40	317	159	56	11.00	368	184
35	5.60	321	160	57	11.30	368	184
36	5.90	327	164	58	11.60	381	190
37	6.15	327	164	59	12.00	381	190
38	6.40	330	165	60	12.30	381	190
39	6.60	330	165	61	12.55	381	190
40	6.90	330	165	62	12.90	381	190
41	7.20	330	165	63	13.30	381	190
42	7.40	330	165	64	13.70	394	197
43	7.60	343	171	65	14.00	394	197
44	7.90	343	171	66	14.30	394	197
45	8.10	343	171	67	14.80	394	197
46	8.40	343	171	68	15.40	394	197
47	8.60	356	178	69	15.80	394	197
48	8.90	356	178	70	16.40	394	197
49	9.20	356	178	71	17.00	406	203
50	9.40	356	178	72	17.40	406	203
51	9.70	368	184	73	17.80	406	203
52	10.00	368	184	74	18.40	406	203
53	10.20	368	184	75	19.00	406	203
54	10.40	368	184	76	19.40	406	203

## No. 116.

### SOLID REAMERS.

SHORT SET.



Diam., Inches.	Price Each.	Whole Length, Inches.	Length of Flutes Inches.	Diam., Inches.	Price Each.	Whole Length, Inches.	Length of Flutes, Inches.
$\frac{1}{4}$	\$1.30	$3\frac{9}{16}$	2	$1\frac{1}{4}$	\$3.70	$8\frac{5}{8}$	$4\frac{1}{2}$
$\frac{9}{32}$	1.35	$3\frac{11}{16}$	$2\frac{1}{8}$	$1\frac{3}{8}$	3.80	$8\frac{11}{16}$	$4\frac{5}{8}$
$\frac{5}{16}$	1.40	4	$2\frac{1}{4}$	$1\frac{5}{8}$	3.90	9	$4\frac{3}{4}$
$\frac{11}{32}$	1.45	$4\frac{1}{8}$	$2\frac{1}{2}$	$1\frac{3}{4}$	4.00	$9\frac{3}{16}$	$4\frac{7}{8}$
$\frac{3}{8}$	1.50	$4\frac{1}{4}$	$2\frac{3}{8}$	$1\frac{7}{8}$	4.10	$9\frac{3}{8}$	5
$\frac{7}{16}$	1.55	$4\frac{3}{8}$	$2\frac{3}{8}$	$1\frac{13}{16}$	4.20	$9\frac{7}{16}$	$5\frac{1}{8}$
$\frac{15}{32}$	1.60	$4\frac{1}{2}$	$2\frac{7}{8}$	$1\frac{7}{8}$	4.35	$9\frac{3}{4}$	$5\frac{1}{4}$
$\frac{1}{2}$	1.65	$4\frac{5}{8}$	$2\frac{1}{2}$	$1\frac{1}{2}$	4.70	10	$5\frac{1}{2}$
$\frac{9}{16}$	1.70	$4\frac{3}{4}$	$2\frac{9}{8}$	$1\frac{5}{8}$	5.20	$10\frac{1}{4}$	$5\frac{5}{8}$
$\frac{5}{8}$	1.75	$4\frac{7}{8}$	$2\frac{5}{8}$	$1\frac{5}{8}$	5.70	$10\frac{1}{2}$	$5\frac{3}{4}$
$\frac{11}{16}$	1.80	5	$2\frac{5}{8}$	$1\frac{11}{16}$	6.20	$10\frac{3}{4}$	$5\frac{7}{8}$
$\frac{3}{4}$	1.85	$5\frac{1}{8}$	$2\frac{11}{16}$	$1\frac{3}{4}$	6.70	11	6
$\frac{7}{8}$	1.90	$5\frac{1}{4}$	$2\frac{3}{4}$	$1\frac{13}{16}$	7.10	$11\frac{1}{4}$	$6\frac{1}{8}$
1	1.95	$5\frac{3}{8}$	$2\frac{13}{16}$	$1\frac{7}{8}$	7.50	$11\frac{1}{2}$	$6\frac{1}{4}$
$1\frac{1}{8}$	2.05	$5\frac{1}{2}$	$2\frac{7}{8}$	$1\frac{15}{16}$	7.90	$11\frac{3}{4}$	$6\frac{3}{8}$
$1\frac{1}{4}$	2.15	$5\frac{5}{8}$	$2\frac{15}{16}$	2	8.30	12	$6\frac{1}{2}$
$1\frac{1}{2}$	2.20	$5\frac{3}{4}$	3	$2\frac{1}{8}$	8.70	$12\frac{1}{8}$	$6\frac{1}{2}$
$1\frac{3}{4}$	2.30	$5\frac{7}{8}$	$3\frac{1}{8}$	$2\frac{1}{4}$	9.10	$12\frac{1}{4}$	$6\frac{5}{8}$
$1\frac{7}{8}$	2.35	6	$3\frac{1}{8}$	$2\frac{3}{8}$	9.50	$12\frac{3}{8}$	$6\frac{5}{8}$
$2$	2.40	$6\frac{3}{16}$	$3\frac{3}{8}$	$2\frac{1}{2}$	9.90	$12\frac{1}{2}$	$6\frac{3}{4}$
$2\frac{1}{8}$	2.50	$6\frac{3}{8}$	$3\frac{1}{4}$	$2\frac{5}{8}$	10.30	$12\frac{5}{8}$	$6\frac{3}{4}$
$2\frac{1}{4}$	2.60	$6\frac{1}{2}$	$3\frac{1}{2}$	$2\frac{3}{4}$	10.80	$12\frac{3}{4}$	$6\frac{7}{8}$
$2\frac{1}{2}$	2.70	$6\frac{3}{4}$	$3\frac{7}{8}$	$2\frac{7}{8}$	11.40	$12\frac{7}{8}$	7
$2\frac{3}{4}$	2.80	$6\frac{11}{16}$	$3\frac{1}{2}$	$2\frac{1}{2}$	12.00	13	7
$3$	2.90	$7\frac{1}{8}$	$3\frac{5}{8}$	$2\frac{9}{16}$	12.60	$13\frac{1}{8}$	$7\frac{1}{8}$
$3\frac{1}{8}$	3.00	$7\frac{1}{4}$	$3\frac{11}{16}$	$2\frac{5}{8}$	13.20	$13\frac{1}{4}$	$7\frac{1}{8}$
$3\frac{1}{4}$	3.10	$7\frac{1}{2}$	$3\frac{3}{4}$	$2\frac{11}{16}$	13.85	$13\frac{3}{8}$	$7\frac{1}{4}$
$3\frac{1}{2}$	3.20	$7\frac{11}{16}$	$3\frac{13}{16}$	$2\frac{3}{4}$	14.50	$13\frac{1}{2}$	$7\frac{1}{4}$
$3\frac{3}{4}$	3.30	$7\frac{7}{8}$	4	$2\frac{13}{16}$	15.20	$13\frac{5}{8}$	$7\frac{3}{8}$
$4$	3.40	$8\frac{1}{16}$	$4\frac{1}{8}$	$2\frac{7}{8}$	15.95	$13\frac{3}{4}$	$7\frac{3}{8}$
$4\frac{1}{8}$	3.50	$8\frac{1}{4}$	$4\frac{1}{4}$	$2\frac{15}{16}$	16.70	$13\frac{7}{8}$	$7\frac{1}{2}$
$4\frac{1}{4}$	3.60	$8\frac{7}{16}$	$4\frac{3}{8}$	3	17.50	14	$7\frac{1}{2}$

32nd sizes not listed furnished at intermediate prices and 64th sizes at price of next larger 32nd size.

## No. 116A.

## SOLID REAMERS.

WITH THREADED ENDS.

SHORT SET.



Diam. Inches.	Price Each.	Whole Length, Inches.	Length of Flutes Inches.	Diam. Inches.	Price Each.	Whole Length Inches.	Length of Flutes, Inches.
$\frac{1}{4}$	\$1.30	$3\frac{9}{16}$	2	$1\frac{1}{4}$	\$3.70	$8\frac{5}{8}$	$4\frac{1}{2}$
$\frac{9}{32}$	1.35	$3\frac{11}{16}$	$2\frac{1}{8}$	$1\frac{3}{32}$	3.80	$8\frac{11}{16}$	$4\frac{5}{8}$
$\frac{5}{16}$	1.40	4	$2\frac{1}{4}$	$1\frac{1}{8}$	3.90	9	$4\frac{3}{4}$
$\frac{11}{32}$	1.45	$4\frac{1}{8}$	$2\frac{5}{16}$	$1\frac{11}{32}$	4.00	$9\frac{3}{16}$	$4\frac{7}{8}$
$\frac{3}{8}$	1.50	$4\frac{1}{4}$	$2\frac{3}{8}$	$1\frac{1}{2}$	4.10	$9\frac{1}{8}$	5
$\frac{13}{32}$	1.55	$4\frac{3}{8}$	$2\frac{3}{8}$	$1\frac{1}{2}$	4.20	$9\frac{1}{8}$	$5\frac{1}{8}$
$\frac{7}{16}$	1.60	$4\frac{1}{2}$	$2\frac{1}{2}$	$1\frac{1}{8}$	4.35	$9\frac{3}{4}$	$5\frac{1}{4}$
$\frac{15}{32}$	1.65	$4\frac{5}{8}$	$2\frac{1}{2}$	$1\frac{1}{2}$	4.70	10	$5\frac{1}{2}$
$\frac{1}{2}$	1.70	$4\frac{3}{4}$	$2\frac{1}{8}$	$1\frac{1}{8}$	5.20	$10\frac{1}{4}$	$5\frac{5}{8}$
$\frac{17}{32}$	1.75	$4\frac{7}{8}$	$2\frac{1}{8}$	$1\frac{5}{8}$	5.70	$10\frac{1}{2}$	$5\frac{3}{4}$
$\frac{9}{16}$	1.80	5	$2\frac{3}{8}$	$1\frac{1}{2}$	6.20	$10\frac{3}{4}$	$5\frac{5}{8}$
$\frac{19}{32}$	1.85	$5\frac{1}{8}$	$2\frac{1}{8}$	$1\frac{3}{4}$	6.70	11	6
$\frac{5}{8}$	1.90	$5\frac{1}{4}$	$2\frac{3}{4}$	$1\frac{1}{8}$	7.10	$11\frac{1}{4}$	$6\frac{1}{8}$
$\frac{21}{32}$	1.95	$5\frac{3}{8}$	$2\frac{1}{8}$	$1\frac{7}{8}$	7.50	$11\frac{1}{2}$	$6\frac{1}{4}$
$\frac{11}{16}$	2.05	$5\frac{1}{2}$	$2\frac{7}{8}$	$1\frac{1}{8}$	7.90	$11\frac{3}{4}$	$6\frac{3}{8}$
$\frac{23}{32}$	2.15	$5\frac{5}{8}$	$2\frac{1}{8}$	2	8.30	12	$6\frac{1}{2}$
$\frac{3}{4}$	2.20	$5\frac{3}{4}$	3	$2\frac{1}{8}$	8.70	$12\frac{1}{8}$	$6\frac{1}{2}$
$\frac{25}{32}$	2.30	$5\frac{7}{8}$	$3\frac{1}{8}$	$2\frac{1}{8}$	9.10	$12\frac{1}{4}$	$6\frac{5}{8}$
$\frac{13}{16}$	2.35	6	$3\frac{3}{8}$	$2\frac{3}{16}$	9.50	$12\frac{3}{8}$	$6\frac{5}{8}$
$\frac{27}{32}$	2.40	$6\frac{3}{16}$	$3\frac{1}{8}$	$2\frac{1}{4}$	9.90	$12\frac{1}{2}$	$6\frac{3}{4}$
$\frac{7}{8}$	2.50	$6\frac{3}{8}$	$3\frac{1}{4}$	$2\frac{5}{16}$	10.30	$12\frac{5}{8}$	$6\frac{3}{4}$
$\frac{29}{32}$	2.60	$6\frac{1}{8}$	$3\frac{5}{8}$	$2\frac{3}{8}$	10.80	$12\frac{3}{4}$	$6\frac{7}{8}$
$\frac{15}{16}$	2.70	$6\frac{3}{4}$	$3\frac{7}{8}$	$2\frac{7}{16}$	11.40	$12\frac{7}{8}$	7
$\frac{31}{32}$	2.80	$6\frac{1}{2}$	$3\frac{1}{2}$	$2\frac{1}{2}$	12.00	13	7
1	2.90	$7\frac{1}{8}$	$3\frac{5}{8}$	$2\frac{9}{16}$	12.60	$13\frac{1}{8}$	$7\frac{1}{8}$
$1\frac{1}{32}$	3.00	$7\frac{5}{16}$	$3\frac{1}{8}$	$2\frac{5}{8}$	13.20	$13\frac{1}{4}$	$7\frac{1}{8}$
$1\frac{1}{16}$	3.10	$7\frac{1}{2}$	$3\frac{3}{4}$	$2\frac{1}{2}$	13.85	$13\frac{3}{8}$	$7\frac{1}{4}$
$1\frac{3}{32}$	3.20	$7\frac{11}{16}$	$3\frac{1}{2}$	$2\frac{3}{4}$	14.50	$13\frac{1}{2}$	$7\frac{1}{4}$
$1\frac{1}{8}$	3.30	$7\frac{7}{8}$	4	$2\frac{1}{2}$	15.20	$13\frac{5}{8}$	$7\frac{3}{8}$
$1\frac{1}{32}$	3.40	$8\frac{1}{16}$	$4\frac{1}{8}$	$2\frac{7}{8}$	15.95	$13\frac{3}{4}$	$7\frac{3}{8}$
$1\frac{3}{16}$	3.50	$8\frac{1}{4}$	$4\frac{1}{4}$	$2\frac{1}{2}$	16.70	$13\frac{7}{8}$	$7\frac{1}{2}$
$1\frac{1}{2}$	3.60	$8\frac{7}{16}$	$4\frac{3}{8}$	3	17.50	14	$7\frac{1}{2}$

32nd sizes not listed furnished at intermediate prices and 64th sizes at price of next larger 32nd size.

**REAMERS IN SETS.****No. 115.****No. 115B.****No. 115 C.**

Sets of Reamers of styles illustrated above take the following prices. For lengths and list prices see pages 163-166.

Set, $\frac{1}{4}$ to 1 inch in diameter, by 16ths	\$30.00
Set, $\frac{1}{4}$ to $1\frac{1}{4}$ inches in diameter, by 16ths	48.00
Set, $\frac{1}{4}$ to $1\frac{1}{2}$ inches in diameter, by 16ths	70.00
Set, $\frac{1}{4}$ to 2 inches in diameter, by 16ths	135.00
Set, $\frac{1}{4}$ to 1 inch in diameter, by 32nds	57.50
Set, $\frac{1}{4}$ to $1\frac{1}{4}$ inches in diameter, by 32nds	92.00
Set, $\frac{1}{4}$ to $1\frac{1}{2}$ inches in diameter, by 32nds	137.00
Set, $\frac{1}{4}$ to 2 inches in diameter, by 32nds	265.00

**No. 118.****MORSE TAPER REAMERS.**

Set of No. 118 Reamers consisting of 1 each Nos. 1, 2, 3, 4, 5 . . . . . \$18.50  
For lengths and list prices see page 182.

**No. 120 B.****BIT STOCK TAPER REAMERS.**

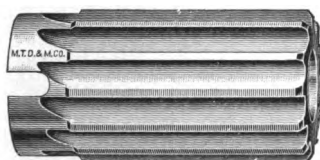
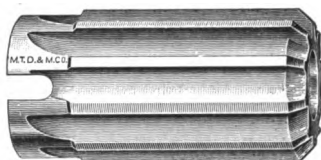
Set of No. 120 B. Reamers consisting of 1 each  $\frac{1}{4}$  to  $\frac{3}{4}$  by 16ths, . . . . . \$6.50  
For lengths and list prices see page 196.

**No. 120 D.****TAPER-PIN REAMERS.**

Set of No. 120 D Reamers consisting of 1 each Nos. 0 to 10 inclusive; . . . . . \$23.50  
For lengths and list prices see page 200.



## SHELL REAMERS.

No. 117.  
SHELL REAMER.No. 117A.  
ROSE SHELL REAMER.

Diam., Inches.	Price Each.	Whole Length, Inches.	Size Hole, Inches.	Diam., Inches.	Price Each.	Whole Length, Inches.	Size Hole, Inches.
$\frac{1}{2}$	\$1.40	2	$\frac{1}{4}$	$2\frac{1}{8}$	\$5.60	$3\frac{3}{4}$	$1\frac{1}{4}$
$\frac{5}{16}$	1.50	2	$\frac{1}{4}$	$2\frac{3}{16}$	5.80	$3\frac{3}{4}$	$1\frac{1}{4}$
$\frac{3}{8}$	1.60	$2\frac{1}{4}$	$\frac{3}{8}$	$2\frac{1}{4}$	6.00	$3\frac{3}{4}$	$1\frac{1}{4}$
$\frac{7}{16}$	1.60	$2\frac{1}{4}$	$\frac{3}{8}$	$2\frac{5}{16}$	6.20	$3\frac{3}{4}$	$1\frac{1}{4}$
$\frac{3}{4}$	1.60	$2\frac{1}{2}$	$\frac{1}{2}$	$2\frac{3}{8}$	6.40	$3\frac{3}{4}$	$1\frac{1}{4}$
$\frac{13}{16}$	1.60	$2\frac{1}{2}$	$\frac{1}{2}$	$2\frac{7}{8}$	6.60	$3\frac{3}{4}$	$1\frac{1}{4}$
$\frac{7}{8}$	1.70	$2\frac{1}{2}$	$\frac{1}{2}$	$2\frac{1}{2}$	6.80	$3\frac{3}{4}$	$1\frac{1}{4}$
$\frac{15}{16}$	1.70	$2\frac{1}{2}$	$\frac{1}{2}$	$2\frac{9}{16}$	7.00	4	$1\frac{1}{2}$
1	1.80	$2\frac{3}{4}$	$\frac{5}{8}$	$2\frac{5}{8}$	7.30	4	$1\frac{1}{2}$
$1\frac{1}{16}$	1.80	$2\frac{3}{4}$	$\frac{5}{8}$	$2\frac{11}{16}$	7.60	4	$1\frac{1}{2}$
$1\frac{1}{8}$	1.90	$2\frac{3}{4}$	$\frac{5}{8}$	$2\frac{3}{4}$	8.00	4	$1\frac{1}{2}$
$1\frac{3}{16}$	2.00	$2\frac{3}{4}$	$\frac{5}{8}$	$2\frac{13}{16}$	8.40	4	$1\frac{1}{2}$
$1\frac{1}{4}$	2.20	$2\frac{3}{4}$	$\frac{5}{8}$	$2\frac{7}{8}$	8.80	4	$1\frac{1}{2}$
$1\frac{5}{16}$	2.40	3	$\frac{3}{4}$	$2\frac{15}{16}$	9.20	4	$1\frac{1}{2}$
$1\frac{3}{8}$	2.60	3	$\frac{3}{4}$	3	9.60	4	$1\frac{1}{2}$
$1\frac{7}{16}$	2.80	3	$\frac{3}{4}$	$3\frac{1}{16}$	9.90	$4\frac{1}{2}$	$1\frac{3}{4}$
$1\frac{1}{2}$	3.00	3	$\frac{3}{4}$	$3\frac{1}{8}$	10.20	$4\frac{1}{2}$	$1\frac{3}{4}$
$1\frac{9}{16}$	3.20	3	$\frac{3}{4}$	$3\frac{3}{16}$	10.60	$4\frac{1}{2}$	$1\frac{3}{4}$
$1\frac{5}{8}$	3.50	3	$\frac{3}{4}$	$3\frac{1}{4}$	11.00	$4\frac{1}{2}$	$1\frac{3}{4}$
$1\frac{11}{16}$	3.80	$3\frac{1}{2}$	1	$3\frac{5}{16}$	11.50	$4\frac{1}{2}$	$1\frac{3}{4}$
$1\frac{3}{4}$	4.10	$3\frac{1}{2}$	1	$3\frac{3}{8}$	12.00	$4\frac{1}{2}$	$1\frac{3}{4}$
$1\frac{13}{16}$	4.40	$3\frac{1}{2}$	1	$3\frac{7}{16}$	12.50	$4\frac{1}{2}$	$1\frac{3}{4}$
$1\frac{7}{8}$	4.70	$3\frac{1}{2}$	1	$3\frac{1}{2}$	13.00	$4\frac{1}{2}$	$1\frac{3}{4}$
$1\frac{15}{16}$	5.00	$3\frac{1}{2}$	1	$3\frac{9}{16}$	13.50	5	2
2	5.20	$3\frac{1}{2}$	1	$3\frac{5}{8}$	14.00	5	2
$2\frac{1}{16}$	5.40	$3\frac{3}{4}$	$1\frac{1}{4}$	$3\frac{11}{16}$	14.50	5	2

Shell Reamers have taper holes, the diameter given being at the large end.

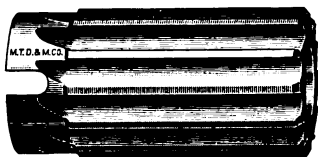
For Arbors fitting these Reamers see page 153 and 158.

Reamers style 117 A have no radial clearance but are ground with a longitudinal clearance. Keep cutting points sharp.

## SHELL REAMERS.

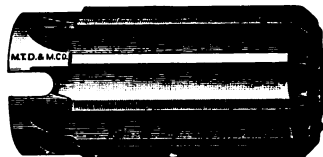
No. 117.

SHELL REAMER.



No. 117A.

ROSE SHELL REAMER.



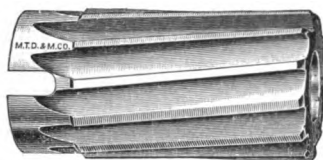
Diam., Inches.	Price Each.	Whole Length, Inches.	Size Hole, Inches.	Diam., Inches.	Price Each.	Whole Length, Inches.	Size Hole, Inches.
3 3/4	\$15.00	5	2	5 7/8	\$33.00	6	2 1/2
3 11/8	15.50	5	2	5 1/2	34.00	6	2 1/2
3 7/8	16.00	5	2	5 1 5/8	35.25	6 1/2	2 3/4
3 11/4	17.00	5	2	5 5/8	36.50	6 1/2	2 3/4
4	18.00	5	2	5 11/8	37.75	6 1/2	2 3/4
4 1/8	18.30	5 1/2	2 1/4	5 3/4	39.00	6 1/2	2 3/4
4 1/4	18.60	5 1/2	2 1/4	5 11/8	40.50	6 1/2	2 3/4
4 3/8	19.00	5 1/2	2 1/4	5 7/8	42.00	6 1/2	2 3/4
4 1/2	19.40	5 1/2	2 1/4	5 11/8	43.50	6 1/2	2 3/4
4 5/8	19.80	5 1/2	2 1/4	6	45.00	6 1/2	2 3/4
4 3/4	20.20	5 1/2	2 1/4	6 1/8	46.75	6 1/2	2 3/4
4 7/8	20.60	5 1/2	2 1/4	6 1/4	48.50	6 1/2	2 3/4
4 1/2	21.00	5 1/2	2 1/4	6 3/8	50.25	6 1/2	2 3/4
4 5/8	21.60	6	2 1/2	6 1/2	52.00	6 1/2	2 3/4
4 3/4	22.20	6	2 1/2	6 5/8	54.00	6 1/2	2 3/4
4 7/8	22.80	6	2 1/2	6 3/4	56.00	6 1/2	2 3/4
4 1/2	23.40	6	2 1/2	6 7/8	58.00	6 1/2	2 3/4
4 5/8	24.00	6	2 1/2	6 1/2	60.00	6 1/2	2 3/4
4 3/4	24.60	6	2 1/2	6 5/8	62.50	7	3
4 7/8	25.20	6	2 1/2	6 3/4	65.00	7	3
4 1/2	26.00	6	2 1/2	6 11/8	67.50	7	3
5	27.00	6	2 1/2	6 3/8	70.00	7	3
5 1/8	28.00	6	2 1/2	6 11/8	72.50	7	3
5 1/4	29.00	6	2 1/2	6 7/8	75.00	7	3
5 3/8	30.00	6	2 1/2	6 11/8	77.50	7	3
5 1/2	31.00	6	2 1/2	7	80.00	7	3
5 3/4	32.00	6	2 1/2				

Shell Reamers have taper holes, the diameter given being at the large end.

For Arbors fitting these Reamers see pages 153 and 158.

Reamers style 117 A have no radial clearance but are ground with a longitudinal clearance. Keep cutting points sharp.

**No. 117½.**  
**SHELL REAMERS**  
 WITH SPIRAL FLUTES.

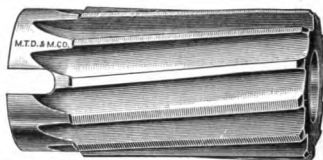


Diam., Inches.	Price Each.	Whole Length, Inches.	Size Hole, Inches.	Diam., Inches.	Price Each.	Whole Length, Inches.	Size Hole, Inches.
½	\$1.40	2	¼	2 ⅛	\$5.60	3 ¾	1 ¼
⅝	1.50	2	¼	2 ⅜	5.80	3 ¾	1 ¼
⅞	1.60	2 ¼	⅜	2 ¼	6.00	3 ¾	1 ¼
1	1.60	2 ¼	⅜	2 ⅝	6.20	3 ¾	1 ¼
1 ⅛	1.60	2 ½	½	2 ⅝	6.40	3 ¾	1 ¼
1 ¼	1.60	2 ½	½	2 ⅞	6.60	3 ¾	1 ¼
1 ½	1.70	2 ½	½	2 ⅞	6.80	3 ¾	1 ¼
1 ⅝	1.70	2 ½	½	2 ⅞	7.00	4	1 ½
1 ¾	1.80	2 ¾	⅝	2 ⅝	7.30	4	1 ½
1 ⅞	1.80	2 ¾	⅝	2 ⅞	7.60	4	1 ½
2	1.90	2 ¾	⅝	2 ¾	8.00	4	1 ½
2 ⅛	2.00	2 ¾	⅝	2 ⅞	8.40	4	1 ½
2 ¼	2.20	2 ¾	⅝	2 ⅞	8.80	4	1 ½
2 ½	2.40	3	¾	2 ⅞	9.20	4	1 ½
2 ⅝	2.60	3	¾	3	9.60	4	1 ½
2 ⅞	2.80	3	¾	3 ⅛	9.90	4 ½	1 ¾
3	3.00	3	¾	3 ⅛	10.20	4 ½	1 ¾
3 ⅛	3.20	3	¾	3 ⅜	10.60	4 ½	1 ¾
3 ¼	3.50	3	¾	3 ¼	11.00	4 ½	1 ¾
3 ½	3.80	3 ½	1	3 ⅝	11.50	4 ½	1 ¾
3 ¾	4.10	3 ½	1	3 ⅝	12.00	4 ½	1 ¾
3 ⅞	4.40	3 ½	1	3 ⅞	12.50	4 ½	1 ¾
4	4.70	3 ½	1	3 ½	13.00	4 ½	1 ¾
4 ⅛	5.00	3 ½	1	3 ⅞	13.50	5	2
4 ¼	5.20	3 ½	1	3 ⅞	14.00	5	2
4 ½	5.40	3 ¾	1 ¼	3 ⅞	14.50	5	2

Shell Reamers with spiral flutes have taper holes, the diameter given being at the large end.

For Arbors fitting these Reamers see pages 153 and 158.

**No 117½.**  
**SHELL REAMERS**  
**WITH SPIRAL FLUTES.**

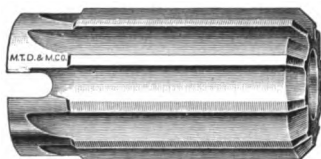
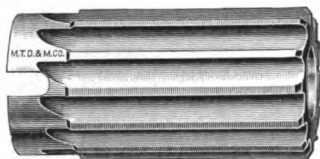


Diam., Inches.	Price Each.	Whole Length, Inches.	Size Hole, Inches.	Diam., Inches.	Price Each.	Whole Length, Inches.	Size Hole, Inches.
3¾	\$15.00	5	2	5⅞	\$33.00	6	2½
3⅞	15.50	5	2	5½	34.00	6	2½
3⅞	16.00	5	2	5⅞	35.25	6½	2¾
3⅞	17.00	5	2	5⅞	36.50	6½	2¾
4	18.00	5	2	5⅞	37.75	6½	2¾
4⅞	18.30	5½	2¼	5¾	39.00	6½	2¾
4⅞	18.60	5½	2¼	5⅞	40.50	6½	2¾
4⅞	19.00	5½	2¼	5⅞	42.00	6½	2¾
4¼	19.40	5½	2¼	5⅞	43.50	6½	2¾
4⅞	19.80	5½	2¼	6	45.00	6½	2¾
4⅞	20.20	5½	2¼	6⅞	46.75	6½	2¾
4⅞	20.60	5½	2¼	6⅞	48.50	6½	2¾
4½	21.00	5½	2¼	6⅞	50.25	6½	2¾
4⅞	21.60	6	2½	6¼	52.00	6½	2¾
4⅞	22.20	6	2½	6⅞	54.00	6½	2¾
4⅞	22.80	6	2½	6⅞	56.00	6½	2¾
4¾	23.40	6	2½	6⅞	58.00	6½	2¾
4⅞	24.00	6	2½	6½	60.00	6½	2¾
4⅞	24.60	6	2½	6⅞	62.50	7	3
4⅞	25.20	6	2½	6⅞	65.00	7	3
5	26.00	6	2½	6⅞	67.50	7	3
5⅞	27.00	6	2½	6¾	70.00	7	3
5⅞	28.00	6	2½	6⅞	72.50	7	3
5⅞	29.00	6	2½	6⅞	75.00	7	3
5¼	30.00	6	2½	6⅞	77.50	7	3
5⅞	31.00	6	2½	7	80.00	7	3
5⅞	32.00	6	2½				

Shell Reamers with spiral flutes have taper holes, the diameter given being at the large end.  
 For Arbors fitting these Reamers see pages 153 and 158.

## SHELL REAMERS

**No. 117 B.** MILLIMETER SIZES. **No. 117½ B.**  
**SHELL REAMER.** **ROSE SHELL REAMER.**

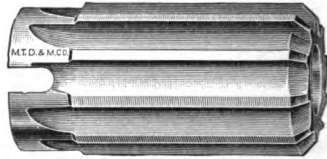
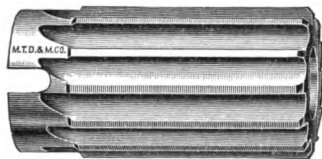


Diameter, M. M.	Price Each.	Whole Length, M. M.	Fitting Arbor, No.	Diameter, M. M.	Price Each.	Whole Length, M. M.	Fitting Arbor, No.
13	\$1.45	51	3	42	\$3.65	76	7
14	1.50	51	3	43	3.85	89	8
15	1.55	51	3	44	4.05	89	8
16	1.60	57	4	45	4.25	89	8
17	1.60	57	4	46	4.40	89	8
18	1.60	57	4	47	4.60	89	8
19	1.60	57	4	48	4.80	89	8
20	1.60	63	5	49	5.00	89	8
21	1.65	63	5	50	5.10	89	8
22	1.70	63	5	51	5.25	89	8
23	1.70	63	5	52	5.40	89	8
24	1.70	63	5	53	5.50	95	9
25	1.80	63	5	54	5.65	95	9
26	1.80	70	6	55	5.80	95	9
27	1.80	70	6	56	5.90	95	9
28	1.90	70	6	57	6.00	95	9
29	1.95	70	6	58	6.15	95	9
30	2.00	70	6	59	6.30	95	9
31	2.15	70	6	60	6.40	95	9
32	2.30	70	6	61	6.50	95	9
33	2.40	70	6	62	6.65	95	9
34	2.50	76	7	63	6.80	95	9
35	2.60	76	7	64	6.90	95	9
36	2.75	76	7	65	7.00	95	9
37	2.90	76	7	66	7.20	102	10
38	3.00	76	7	67	7.40	102	10
39	3.10	76	7	68	7.60	102	10
40	3.30	76	7	69	7.80	102	10
41	3.50	76	7	70	8.05	102	10

Shell Reamers have taper holes.

For Arbors fitting these Reamers see pages 153 and 158.

Reamers style 117½ B have no radial clearance but are ground with a longitudinal clearance. Keep cutting points sharp.

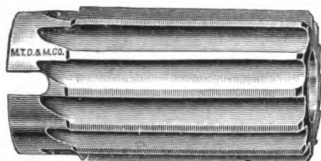
**SHELL REAMERS.****No. 117B.****MILLIMETER SIZES. No. 117½B.****SHELL REAMER.****ROSE SHELL REAMER.**

Diameter, M. M.	Price Each.	Whole Length, M. M.	Fitting Arbor, No.	Diameter, M. M.	Price Each.	Whole Length, M. M.	Fitting Arbor, No.
71	\$8.35	102	10	100	\$17.00	127	12
72	8.60	102	10	101	18.00	127	12
73	8.80	102	10	102	18.15	127	12
74	9.10	102	10	103	18.30	127	12
75	9.40	102	10	104	18.60	140	13
76	9.60	102	10	105	18.80	140	13
77	9.75	102	10	106	19.00	140	13
78	10.05	114	11	107	19.20	140	13
79	10.20	114	11	108	19.60	140	13
80	10.40	114	11	109	19.80	140	13
81	10.60	114	11	110	20.00	140	13
82	11.00	114	11	111	20.20	140	13
83	11.25	114	11	112	20.60	140	13
84	11.50	114	11	113	20.80	140	13
85	12.00	114	11	114	21.00	140	13
86	12.25	114	11	115	21.30	140	13
87	12.50	114	11	116	21.90	152	14
88	12.75	114	11	117	22.20	152	14
89	13.25	114	11	118	22.50	152	14
90	13.50	114	11	119	22.80	152	14
91	13.75	127	12	120	23.40	152	14
92	14.00	127	12	121	23.70	152	14
93	14.50	127	12	122	24.00	152	14
94	14.75	127	12	123	24.30	152	14
95	15.00	127	12	124	24.90	152	14
96	15.25	127	12	125	25.20	152	14
97	15.75	127	12	126	25.60	152	14
98	16.00	127	12	127	26.00	152	14
99	16.50	127	12	128	27.00	152	14

Shell Reamers have taper holes.

For Arbors fitting these Reamers see pages 153 and 158.

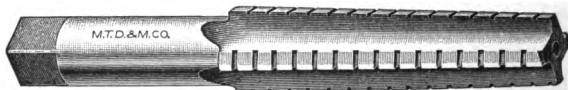
Reamers style 117½ B have no radial clearance but are ground with a longitudinal clearance. Keep cutting points sharp.



**No. 117 C.**  
**SHELL REAMERS**  
 WITH STRAIGHT HOLES.

Diam. Inches.	Price Each.	Whole Length, Inches.	Length of Flutes, Inches.	Diam. of Hole, Inches.	Diam. Inches.	Price Each.	Whole Length, Inches.	Length of Flutes, Inches.	Diam., of Hole, Inches.
1 $\frac{1}{8}$	\$1.80	2 $\frac{5}{8}$	2 $\frac{1}{4}$	$\frac{1}{2}$	3 $\frac{1}{8}$	\$9.90	3	2 $\frac{1}{2}$	1
1 $\frac{1}{8}$	1.90	2 $\frac{5}{8}$	2 $\frac{1}{4}$	$\frac{1}{2}$	3 $\frac{1}{8}$	10.20	3	2 $\frac{1}{2}$	1
1 $\frac{3}{8}$	2.00	2 $\frac{5}{8}$	2 $\frac{1}{4}$	$\frac{1}{2}$	3 $\frac{3}{8}$	10.60	3	2 $\frac{1}{2}$	1
1 $\frac{1}{4}$	2.20	2 $\frac{5}{8}$	2 $\frac{1}{4}$	$\frac{1}{2}$	3 $\frac{1}{4}$	11.00	3 $\frac{1}{4}$	2 $\frac{3}{4}$	1 $\frac{1}{4}$
1 $\frac{5}{8}$	2.40	2 $\frac{5}{8}$	2 $\frac{1}{4}$	$\frac{1}{2}$	3 $\frac{5}{8}$	11.50	3 $\frac{1}{4}$	2 $\frac{3}{4}$	1 $\frac{1}{4}$
1 $\frac{3}{8}$	2.60	2 $\frac{3}{4}$	2 $\frac{3}{8}$	$\frac{5}{8}$	3 $\frac{3}{8}$	12.00	3 $\frac{1}{4}$	2 $\frac{3}{4}$	1 $\frac{1}{4}$
1 $\frac{7}{8}$	2.80	2 $\frac{3}{4}$	2 $\frac{3}{8}$	$\frac{5}{8}$	3 $\frac{7}{8}$	12.50	3 $\frac{1}{4}$	2 $\frac{3}{4}$	1 $\frac{1}{4}$
1 $\frac{1}{2}$	3.00	2 $\frac{3}{4}$	2 $\frac{3}{8}$	$\frac{5}{8}$	3 $\frac{1}{2}$	13.00	3 $\frac{1}{4}$	2 $\frac{3}{4}$	1 $\frac{1}{4}$
1 $\frac{9}{8}$	3.20	2 $\frac{3}{4}$	2 $\frac{3}{8}$	$\frac{5}{8}$	3 $\frac{9}{8}$	13.50	3 $\frac{1}{4}$	2 $\frac{3}{4}$	1 $\frac{1}{4}$
1 $\frac{5}{8}$	3.50	2 $\frac{3}{4}$	2 $\frac{3}{8}$	$\frac{5}{8}$	3 $\frac{5}{8}$	14.00	3 $\frac{1}{4}$	2 $\frac{3}{4}$	1 $\frac{1}{4}$
1 $\frac{11}{8}$	3.80	2 $\frac{3}{4}$	2 $\frac{3}{8}$	$\frac{5}{8}$	3 $\frac{11}{8}$	14.50	3 $\frac{1}{4}$	2 $\frac{3}{4}$	1 $\frac{1}{4}$
1 $\frac{3}{4}$	4.10	2 $\frac{3}{4}$	2 $\frac{3}{8}$	$\frac{5}{8}$	3 $\frac{3}{4}$	15.00	3 $\frac{5}{8}$	3 $\frac{1}{8}$	1 $\frac{1}{2}$
1 $\frac{11}{8}$	4.40	2 $\frac{3}{4}$	2 $\frac{3}{8}$	$\frac{5}{8}$	3 $\frac{11}{8}$	15.50	3 $\frac{5}{8}$	3 $\frac{1}{8}$	1 $\frac{1}{2}$
1 $\frac{7}{8}$	4.70	2 $\frac{3}{4}$	2 $\frac{3}{8}$	$\frac{3}{4}$	3 $\frac{7}{8}$	16.00	3 $\frac{5}{8}$	3 $\frac{1}{8}$	1 $\frac{1}{2}$
1 $\frac{11}{8}$	5.00	2 $\frac{3}{4}$	2 $\frac{3}{8}$	$\frac{3}{4}$	3 $\frac{11}{8}$	17.00	3 $\frac{5}{8}$	3 $\frac{1}{8}$	1 $\frac{1}{2}$
2	5.20	2 $\frac{3}{4}$	2 $\frac{3}{8}$	$\frac{3}{4}$	4	18.00	3 $\frac{5}{8}$	3 $\frac{1}{8}$	1 $\frac{1}{2}$
2 $\frac{1}{8}$	5.40	2 $\frac{3}{4}$	2 $\frac{3}{8}$	$\frac{3}{4}$	4 $\frac{1}{8}$	18.30	3 $\frac{5}{8}$	3 $\frac{1}{8}$	1 $\frac{1}{2}$
2 $\frac{1}{8}$	5.60	2 $\frac{3}{4}$	2 $\frac{3}{8}$	$\frac{3}{4}$	4 $\frac{1}{8}$	18.60	3 $\frac{5}{8}$	3 $\frac{1}{8}$	1 $\frac{1}{2}$
2 $\frac{3}{8}$	5.80	2 $\frac{3}{4}$	2 $\frac{3}{8}$	$\frac{3}{4}$	4 $\frac{3}{8}$	19.00	3 $\frac{5}{8}$	3 $\frac{1}{8}$	1 $\frac{1}{2}$
2 $\frac{1}{4}$	6.00	2 $\frac{3}{4}$	2 $\frac{3}{8}$	$\frac{3}{4}$	4 $\frac{1}{4}$	19.40	4	3 $\frac{3}{8}$	2
2 $\frac{5}{8}$	6.20	2 $\frac{3}{4}$	2 $\frac{3}{8}$	$\frac{3}{4}$	4 $\frac{5}{8}$	19.80	4	3 $\frac{3}{8}$	2
2 $\frac{3}{8}$	6.40	2 $\frac{3}{4}$	2 $\frac{3}{8}$	$\frac{3}{4}$	4 $\frac{3}{8}$	20.20	4	3 $\frac{3}{8}$	2
2 $\frac{7}{8}$	6.60	2 $\frac{3}{4}$	2 $\frac{3}{8}$	$\frac{3}{4}$	4 $\frac{7}{8}$	20.60	4	3 $\frac{3}{8}$	2
2 $\frac{1}{2}$	6.80	3	2 $\frac{1}{2}$	1	4 $\frac{1}{2}$	21.00	4	3 $\frac{3}{8}$	2
2 $\frac{5}{8}$	7.00	3	2 $\frac{1}{2}$	1	4 $\frac{5}{8}$	21.60	4	3 $\frac{3}{8}$	2
2 $\frac{3}{4}$	7.30	3	2 $\frac{1}{2}$	1	4 $\frac{3}{4}$	22.20	4	3 $\frac{3}{8}$	2
2 $\frac{7}{8}$	7.60	3	2 $\frac{1}{2}$	1	4 $\frac{7}{8}$	22.80	4	3 $\frac{3}{8}$	2
2 $\frac{1}{4}$	8.00	3	2 $\frac{1}{2}$	1	4 $\frac{1}{4}$	23.40	4	3 $\frac{3}{8}$	2
2 $\frac{1}{8}$	8.40	3	2 $\frac{1}{2}$	1	4 $\frac{1}{8}$	24.00	4	3 $\frac{3}{8}$	2
2 $\frac{3}{8}$	8.80	3	2 $\frac{1}{2}$	1	4 $\frac{3}{8}$	24.60	4	3 $\frac{3}{8}$	2
2 $\frac{1}{2}$	9.20	3	2 $\frac{1}{2}$	1	4 $\frac{1}{2}$	25.20	4	3 $\frac{3}{8}$	2
3	9.60	3	2 $\frac{1}{2}$	1	5	26.00	4	3 $\frac{3}{8}$	2

These Reamers are made .003 under size and are used as Roughing Reamers to follow Shell Drills No. 102  $\frac{1}{2}$ H on page 114 and to precede Expansion Shell Reamers on page 237. For Arbors fitting these Reamers see pages 157 and 159.

**MORSE TAPER REAMERS.****No. 118.****FINISHING REAMER.****No. 118½.****ROUGHING REAMER.**

Number of Taper.	Price Each.	Whole Length, Inches.	Length of Flutes, Inches.	Size of Finishing Reamer.	
				Large End.	Small End.
0	\$1.60	3¾	2¼	.367	.250
1	2.00	5½	3	.517	.367
2	2.60	7	3½	.745	.569
3	3.40	8	4¼	.988	.775
4	4.20	9	5¼	1.289	1.017
5	6.60	10	6¼	1.799	1.471
6	12.00	12	8½	2.555	2.112
7	35.00	16	12	3.371	2.746

Morse Taper Reamers, larger than No. 1, can be made with oil holes as illustrated in Three-Groove Chucking Reamers, pages 214-229 inclusive.

Reamers for Short Shanks made to order. Prices quoted on application.

**TAPER ROUGHING AND FINISHING REAMERS  
OF SPECIAL DIMENSIONS.**

**No. 118 A.****FINISHING REAMER.****No. 118½ A.****ROUGHING REAMER**

When ordering above give diameter at large and small ends, whole length, length of flutes and taper per foot required.

Prices quoted on application.



**MORSE TAPER REAMERS**

WITH MORSE TAPER SHANKS.

**No. 118 B.**

FINISHING REAMER.

**No. 118½ B.**

ROUGHING REAMER.



Number of Taper.	Price Each.	Whole Length, Inches.	Length of Flutes, Inches.	Size of Finishing Reamer.		Morse Taper Shank Number.
				Large End.	Small End.	
0	\$2.65	5 $\frac{11}{32}$	2 $\frac{1}{4}$	.367	.250	0
1	2.95	6 $\frac{5}{16}$	3	.517	.367	1
2	3.25	7 $\frac{3}{8}$	3 $\frac{1}{2}$	.745	.569	2
3	4.45	8 $\frac{7}{8}$	4 $\frac{1}{4}$	.988	.775	3
4	6.00	10 $\frac{7}{8}$	5 $\frac{1}{4}$	1.289	1.017	4
5	10.10	13 $\frac{1}{8}$	6 $\frac{1}{4}$	1.799	1.471	5
6	21.35	17 $\frac{13}{16}$	8 $\frac{1}{2}$	2.555	2.112	6
7	37.50	21 $\frac{5}{16}$	12	3.371	2.746	6

Morse Taper Reamers, larger than No. 1, can be made with oil holes as illustrated in Three-Groove Chucking Reamers, pages 214 to 229 inclusive.

Reamers for Short Shanks made to order.

Prices quoted on application.

**No. 118 C.****MORSE TAPER REAMERS**

WITH TAPER SQUARE SHANKS

FITTING RATCHETS.



Number of Taper.	Price Each.	Whole Length, Inches.	Length of Flutes, Inches.	Diam. of Flutes.		Size of Shank, Inches.
				Large End.	Small End.	
3	\$3.40	6 $\frac{3}{4}$	4 $\frac{1}{4}$	.988	.775	$\frac{1}{2} \times \frac{3}{4} \times 1 \frac{3}{4}$

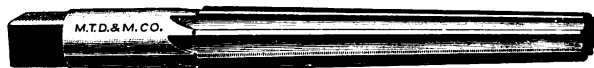
Used by Street Railways in Bonding Work.

## TAPER REAMERS

BROWN AND SHARPE STANDARD.

## No. 118 D.

FINISHING REAMER.



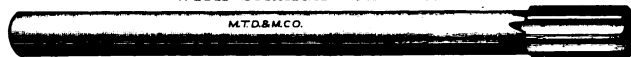
## No. 118½ D.

ROUGHING REAMER.



Number of Taper.	Price Each.	Whole Length, Inches	Length of Flutes, Inches.
1	\$1.75	4¾	2⅞
2	2.00	5⅛	3⅛
3	2.25	5½	3⅜
4	2.50	5⅞	3½
5	3.00	6⅜	4
6	3.25	6⅞	4⅜
7	3.50	7½	4⅞
8	3.75	8⅛	5½
9	4.00	8⅞	6⅛
10	5.00	9¾	6⅞
11	6.00	10⅝	7⅝
12	8.00	11⅜	8¼
13	10.00	12	8¾
14	12.00	12½	9¼
15	14.00	13⅛	9¾
16	16.00	13½	10¼
17	19.00	13¾	10¾
18	22.00	14¼	11¼

**No. 119.**  
**FLUTED CHUCKING REAMERS**  
 WITH STRAIGHT SHANKS.



Diameter, Inches.	Price Each.	Whole Length, Inches.	Length of Flutes, Inches.	Diameter, Inches.	Price Each.	Whole Length, Inches.	Length of Flutes, Inches.
$\frac{1}{4}$	\$ .90	6	$1\frac{1}{2}$	$1\frac{7}{32}$	\$2.85	11	$2\frac{7}{8}$
$\frac{9}{32}$	.95	6	$1\frac{1}{2}$	$1\frac{1}{4}$	2.90	$11\frac{1}{2}$	3
$\frac{5}{16}$	1.00	6	$1\frac{1}{2}$	$1\frac{5}{16}$	3.05	$11\frac{1}{2}$	3
$\frac{11}{32}$	1.05	6	$1\frac{1}{2}$	$1\frac{3}{8}$	3.20	12	$3\frac{1}{4}$
$\frac{3}{8}$	1.10	7	$1\frac{3}{4}$	$1\frac{7}{16}$	3.35	12	$3\frac{1}{4}$
$\frac{13}{32}$	1.15	7	$1\frac{3}{4}$	$1\frac{1}{2}$	3.50	$12\frac{1}{2}$	$3\frac{1}{2}$
$\frac{7}{16}$	1.20	7	$1\frac{3}{4}$	$1\frac{9}{16}$	3.65	$12\frac{1}{2}$	$3\frac{1}{2}$
$\frac{15}{32}$	1.25	7	$1\frac{3}{4}$	$1\frac{5}{8}$	3.80	13	$3\frac{3}{4}$
$\frac{1}{2}$	1.30	8	2	$1\frac{11}{16}$	4.00	13	$3\frac{3}{4}$
$\frac{17}{32}$	1.35	8	2	$1\frac{3}{4}$	4.20	$13\frac{1}{2}$	4
$\frac{9}{16}$	1.40	8	2	$1\frac{13}{16}$	4.40	$13\frac{1}{2}$	4
$\frac{19}{32}$	1.45	8	2	$1\frac{7}{8}$	4.60	14	$4\frac{1}{4}$
$\frac{5}{8}$	1.50	9	$2\frac{1}{4}$	$1\frac{15}{16}$	4.80	14	$4\frac{1}{4}$
$\frac{21}{32}$	1.55	9	$2\frac{1}{4}$	2	5.00	14	$4\frac{1}{4}$
$\frac{11}{16}$	1.60	9	$2\frac{1}{4}$	$2\frac{1}{16}$	5.30	$14\frac{1}{2}$	$4\frac{1}{2}$
$\frac{23}{32}$	1.65	9	$2\frac{1}{4}$	$2\frac{1}{8}$	5.60	$14\frac{1}{2}$	$4\frac{1}{2}$
$\frac{3}{4}$	1.70	$9\frac{1}{2}$	$2\frac{1}{2}$	$2\frac{3}{16}$	5.90	$14\frac{1}{2}$	$4\frac{1}{2}$
$\frac{25}{32}$	1.80	$9\frac{1}{2}$	$2\frac{1}{2}$	$2\frac{1}{4}$	6.20	$14\frac{1}{2}$	$4\frac{1}{2}$
$\frac{13}{16}$	1.85	$9\frac{1}{2}$	$2\frac{1}{2}$	$2\frac{5}{16}$	6.50	15	$4\frac{3}{4}$
$\frac{27}{32}$	1.90	$9\frac{1}{2}$	$2\frac{1}{2}$	$2\frac{3}{8}$	6.80	15	$4\frac{3}{4}$
$\frac{7}{8}$	2.00	10	$2\frac{5}{8}$	$2\frac{7}{16}$	7.10	15	$4\frac{3}{4}$
$\frac{29}{32}$	2.10	10	$2\frac{5}{8}$	$2\frac{1}{2}$	7.40	15	$4\frac{3}{4}$
$\frac{15}{16}$	2.15	10	$2\frac{5}{8}$	$2\frac{9}{16}$	7.70	$15\frac{1}{2}$	5
$\frac{31}{32}$	2.25	10	$2\frac{5}{8}$	$2\frac{5}{8}$	8.00	$15\frac{1}{2}$	5
1	2.30	$10\frac{1}{2}$	$2\frac{3}{4}$	$2\frac{11}{16}$	8.35	$15\frac{1}{2}$	5
$1\frac{1}{32}$	2.40	$10\frac{1}{2}$	$2\frac{3}{4}$	$2\frac{3}{4}$	8.70	$15\frac{1}{2}$	5
$1\frac{1}{16}$	2.45	$10\frac{1}{2}$	$2\frac{3}{4}$	$2\frac{13}{16}$	9.00	16	$5\frac{1}{4}$
$1\frac{1}{32}$	2.55	$10\frac{1}{2}$	$2\frac{3}{4}$	$2\frac{7}{8}$	9.35	16	$5\frac{1}{4}$
$1\frac{1}{8}$	2.60	11	$2\frac{7}{8}$	$2\frac{15}{16}$	9.70	16	$5\frac{1}{4}$
$1\frac{5}{32}$	2.70	11	$2\frac{7}{8}$	3	10.00	16	$5\frac{1}{4}$
$1\frac{3}{16}$	2.75	11	$2\frac{7}{8}$				

These Reamers will be furnished to order .001 to .010 inch undersize at regular prices.  
 Special attention is called to Fluted Chucking Reamers illustrated on pages 187-188.

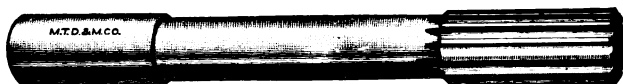
**No. 119 A.**  
**FLUTED CHUCKING REAMERS**  
 WITH MORSE TAPER SHANKS.



Diam. Inches.	Price Each.	Whole Length, Inches.	Length Flutes, Inches.	Morse Taper Shank.	Diam., Inches.	Price Each.	Whole Length, Inches.	Length Flutes, Inches.	Morse Taper Shank.
$\frac{1}{4}$	\$1.20	6	$1\frac{1}{2}$	No. 1	$1\frac{3}{16}$	\$3.30	11	$2\frac{7}{8}$	No. 3
$\frac{3}{32}$	1.20	6	$1\frac{1}{2}$		$1\frac{7}{32}$	3.40	11	$2\frac{7}{8}$	
$\frac{5}{16}$	1.30	6	$1\frac{1}{2}$		$1\frac{1}{4}$	3.50	$11\frac{1}{2}$	3	No. 4
$\frac{11}{32}$	1.30	6	$1\frac{1}{2}$		$1\frac{5}{16}$	3.70	$11\frac{1}{2}$	3	
$\frac{3}{8}$	1.45	7	$1\frac{3}{4}$		$1\frac{3}{8}$	3.95	12	$3\frac{1}{4}$	
$\frac{13}{32}$	1.50	7	$1\frac{3}{4}$		$1\frac{7}{16}$	4.15	12	$3\frac{1}{4}$	
$\frac{7}{16}$	1.55	7	$1\frac{3}{4}$		$1\frac{1}{2}$	4.40	$12\frac{1}{2}$	$3\frac{1}{2}$	
$\frac{15}{32}$	1.60	7	$1\frac{3}{4}$		$1\frac{5}{8}$	4.60	$12\frac{1}{2}$	$3\frac{1}{2}$	
$\frac{1}{2}$	1.65	8	2		$1\frac{5}{8}$	4.85	13	$3\frac{3}{4}$	
$\frac{17}{32}$	1.70	8	2		$1\frac{11}{16}$	5.10	13	$3\frac{3}{4}$	
$\frac{9}{16}$	1.75	8	2		$1\frac{3}{4}$	5.30	$13\frac{1}{2}$	4	
$\frac{19}{32}$	1.80	8	2		$1\frac{13}{16}$	5.50	$13\frac{1}{2}$	4	
$\frac{5}{8}$	1.90	9	$2\frac{1}{4}$	No. 2	$1\frac{7}{8}$	5.70	14	$4\frac{1}{4}$	No. 5
$\frac{21}{32}$	1.95	9	$2\frac{1}{4}$		$1\frac{15}{16}$	5.95	14	$4\frac{1}{4}$	
$\frac{11}{16}$	2.00	9	$2\frac{1}{4}$		2	6.20	14	$4\frac{1}{4}$	
$\frac{23}{32}$	2.10	9	$2\frac{1}{4}$		$2\frac{1}{16}$	6.50	$14\frac{1}{2}$	$4\frac{1}{2}$	
$\frac{3}{4}$	2.20	$9\frac{1}{2}$	$2\frac{1}{2}$		$2\frac{1}{8}$	6.80	$14\frac{1}{2}$	$4\frac{1}{2}$	
$\frac{25}{32}$	2.30	$9\frac{1}{2}$	$2\frac{1}{2}$		$2\frac{3}{16}$	7.10	$14\frac{1}{2}$	$4\frac{1}{2}$	
$\frac{13}{16}$	2.40	$9\frac{1}{2}$	$2\frac{1}{2}$		$2\frac{1}{4}$	7.40	$14\frac{1}{2}$	$4\frac{1}{2}$	
$\frac{27}{32}$	2.50	$9\frac{1}{2}$	$2\frac{1}{2}$		$2\frac{5}{16}$	7.70	15	$4\frac{3}{4}$	
$\frac{7}{8}$	2.55	10	$2\frac{5}{8}$		$2\frac{3}{8}$	8.00	15	$4\frac{3}{4}$	
$\frac{29}{32}$	2.60	10	$2\frac{5}{8}$		$2\frac{7}{16}$	8.40	15	$4\frac{3}{4}$	
$\frac{15}{16}$	2.65	10	$2\frac{5}{8}$	No. 3	$2\frac{1}{2}$	8.80	15	$4\frac{3}{4}$	
$\frac{31}{32}$	2.70	10	$2\frac{5}{8}$		$2\frac{9}{16}$	9.20	$15\frac{1}{2}$	5	
1	2.75	$10\frac{1}{2}$	$2\frac{3}{4}$		$2\frac{5}{8}$	9.60	$15\frac{1}{2}$	5	
$1\frac{1}{32}$	2.80	$10\frac{1}{2}$	$2\frac{3}{4}$		$2\frac{11}{16}$	10.00	$15\frac{1}{2}$	5	
$1\frac{1}{16}$	2.85	$10\frac{1}{2}$	$2\frac{3}{4}$		$2\frac{3}{4}$	10.40	$15\frac{1}{2}$	5	
$1\frac{3}{32}$	2.95	$10\frac{1}{2}$	$2\frac{3}{4}$		$2\frac{13}{16}$	10.80	16	$5\frac{1}{4}$	
$1\frac{1}{8}$	3.10	11	$2\frac{7}{8}$		$2\frac{7}{8}$	11.20	16	$5\frac{1}{4}$	
$1\frac{5}{32}$	3.20	11	$2\frac{7}{8}$		$2\frac{15}{16}$	11.60	16	$5\frac{1}{4}$	
					3	12.00	16	$5\frac{1}{4}$	

These Reamers will be furnished to order .001 to .010 inch undersize at regular prices.

**No. 119 B.**  
**FLUTED CHUCKING REAMERS**  
**WITH STRAIGHT SHANKS.**



FOR SCREW OR CHUCKING MACHINES.

Diameter, Inches.	Price Each.	Whole Length, Inches.	Length of Flutes, Inches.	Diameter of Shank, Inches.	Length of Shank, Inches.
$\frac{1}{4}$	\$1.20	6	$1\frac{1}{2}$	$\frac{1}{4}$	$1\frac{1}{2}$
$\frac{5}{32}$	1.20	6	$1\frac{1}{2}$	$\frac{1}{4}$	$1\frac{1}{2}$
$\frac{5}{16}$	1.30	6	$1\frac{1}{2}$	$\frac{1}{4}$	$1\frac{1}{2}$
$\frac{11}{32}$	1.30	6	$1\frac{1}{2}$	$\frac{1}{4}$	$1\frac{1}{2}$
$\frac{3}{8}$	1.45	7	$1\frac{3}{4}$	$\frac{3}{8}$	$1\frac{3}{4}$
$\frac{13}{32}$	1.50	7	$1\frac{3}{4}$	$\frac{3}{8}$	$1\frac{3}{4}$
$\frac{7}{16}$	1.55	7	$1\frac{3}{4}$	$\frac{3}{8}$	$1\frac{3}{4}$
$\frac{15}{32}$	1.60	7	$1\frac{3}{4}$	$\frac{3}{8}$	$1\frac{3}{4}$
$\frac{1}{2}$	1.65	8	2	$\frac{1}{2}$	2
$\frac{17}{32}$	1.70	8	2	$\frac{1}{2}$	2
$\frac{9}{16}$	1.75	8	2	$\frac{1}{2}$	2
$\frac{19}{32}$	1.80	8	2	$\frac{1}{2}$	2
$\frac{5}{8}$	1.90	9	$2\frac{1}{4}$	$\frac{5}{8}$	$2\frac{1}{4}$
$\frac{21}{32}$	1.95	9	$2\frac{1}{4}$	$\frac{5}{8}$	$2\frac{1}{4}$
$\frac{11}{16}$	2.00	9	$2\frac{1}{4}$	$\frac{5}{8}$	$2\frac{1}{4}$
$\frac{23}{32}$	2.10	9	$2\frac{1}{4}$	$\frac{5}{8}$	$2\frac{1}{4}$
$\frac{3}{4}$	2.20	$9\frac{1}{2}$	$2\frac{1}{2}$	$\frac{3}{4}$	$2\frac{1}{4}$
$\frac{25}{32}$	2.30	$9\frac{1}{2}$	$2\frac{1}{2}$	$\frac{3}{4}$	$2\frac{1}{4}$
$\frac{13}{16}$	2.40	$9\frac{1}{2}$	$2\frac{1}{2}$	$\frac{3}{4}$	$2\frac{1}{4}$
$\frac{27}{32}$	2.50	$9\frac{1}{2}$	$2\frac{1}{2}$	$\frac{3}{4}$	$2\frac{1}{4}$
$\frac{7}{8}$	2.55	10	$2\frac{5}{8}$	$\frac{7}{8}$	$2\frac{1}{2}$
$\frac{29}{32}$	2.60	10	$2\frac{5}{8}$	$\frac{7}{8}$	$2\frac{1}{2}$
$\frac{15}{16}$	2.65	10	$2\frac{5}{8}$	$\frac{7}{8}$	$2\frac{1}{2}$
$\frac{31}{32}$	2.70	10	$2\frac{5}{8}$	$\frac{7}{8}$	$2\frac{1}{2}$
1	2.75	$10\frac{1}{2}$	$2\frac{3}{4}$	1	$2\frac{3}{4}$
$1\frac{1}{32}$	2.80	$10\frac{1}{2}$	$2\frac{3}{4}$	1	$2\frac{3}{4}$
$1\frac{1}{16}$	2.85	$10\frac{1}{2}$	$2\frac{3}{4}$	1	$2\frac{3}{4}$
$1\frac{3}{32}$	2.95	$10\frac{1}{2}$	$2\frac{3}{4}$	1	$2\frac{3}{4}$
$1\frac{1}{8}$	3.10	11	$2\frac{7}{8}$	1	$2\frac{3}{4}$
$1\frac{5}{32}$	3.20	11	$2\frac{7}{8}$	1	$2\frac{3}{4}$
$1\frac{3}{16}$	3.30	11	$2\frac{7}{8}$	1	$2\frac{3}{4}$

These Reamers will be furnished to order .001 to .010 inch undersize at regular prices.

**No. 119B.**  
**FLUTED CHUCKING REAMERS**  
 WITH STRAIGHT SHANKS.



FOR SCREW OR CHUCKING MACHINES.

Diameter, Inches.	Price Each.	Whole Length, Inches.	Length of Flutes, Inches.	Diameter of Shank, Inches.	Length of Shank, Inches.
$1\frac{7}{32}$	\$3.40	11	$2\frac{7}{8}$	1	$2\frac{3}{4}$
$1\frac{1}{4}$	3.50	$11\frac{1}{2}$	3	$1\frac{1}{4}$	3
$1\frac{5}{16}$	3.70	$11\frac{1}{2}$	3	$1\frac{1}{4}$	3
$1\frac{3}{8}$	3.95	12	$3\frac{1}{4}$	$1\frac{1}{4}$	3
$1\frac{7}{16}$	4.15	12	$3\frac{1}{4}$	$1\frac{1}{4}$	3
$1\frac{1}{2}$	4.40	$12\frac{1}{2}$	$3\frac{1}{2}$	$1\frac{1}{4}$	3
$1\frac{9}{16}$	4.60	$12\frac{1}{2}$	$3\frac{1}{2}$	$1\frac{1}{4}$	3
$1\frac{5}{8}$	4.85	13	$3\frac{3}{4}$	$1\frac{1}{4}$	3
$1\frac{11}{16}$	5.10	13	$3\frac{3}{4}$	$1\frac{1}{4}$	3
$1\frac{3}{4}$	5.30	$13\frac{1}{2}$	4	$1\frac{1}{4}$	3
$1\frac{13}{16}$	5.50	$13\frac{1}{2}$	4	$1\frac{1}{4}$	3
$1\frac{7}{8}$	5.70	14	$4\frac{1}{4}$	$1\frac{1}{4}$	3
$1\frac{15}{16}$	5.95	14	$4\frac{1}{4}$	$1\frac{1}{4}$	3
2	6.20	14	$4\frac{1}{4}$	$1\frac{1}{4}$	3
$2\frac{1}{16}$	6.50	$14\frac{1}{2}$	$4\frac{1}{2}$	$1\frac{1}{2}$	$3\frac{1}{2}$
$2\frac{1}{8}$	6.80	$14\frac{1}{2}$	$4\frac{1}{2}$	$1\frac{1}{2}$	$3\frac{1}{2}$
$2\frac{3}{16}$	7.10	$14\frac{1}{2}$	$4\frac{1}{2}$	$1\frac{1}{2}$	$3\frac{1}{2}$
$2\frac{1}{4}$	7.40	$14\frac{1}{2}$	$4\frac{1}{2}$	$1\frac{1}{2}$	$3\frac{1}{2}$
$2\frac{5}{16}$	7.70	15	$4\frac{3}{4}$	$1\frac{1}{2}$	$3\frac{1}{2}$
$2\frac{3}{8}$	8.00	15	$4\frac{3}{4}$	$1\frac{1}{2}$	$3\frac{1}{2}$
$2\frac{7}{16}$	8.40	15	$4\frac{3}{4}$	$1\frac{1}{2}$	$3\frac{1}{2}$
$2\frac{1}{2}$	8.80	15	$4\frac{3}{4}$	$1\frac{1}{2}$	$3\frac{1}{2}$
$2\frac{9}{16}$	9.20	$15\frac{1}{2}$	5	$1\frac{1}{2}$	$3\frac{1}{2}$
$2\frac{5}{8}$	9.60	$15\frac{1}{2}$	5	$1\frac{1}{2}$	$3\frac{1}{2}$
$2\frac{11}{16}$	10.00	$15\frac{1}{2}$	5	$1\frac{1}{2}$	$3\frac{1}{2}$
$2\frac{3}{4}$	10.40	$15\frac{1}{2}$	5	$1\frac{1}{2}$	$3\frac{1}{2}$
$2\frac{13}{16}$	10.80	16	$5\frac{1}{4}$	$1\frac{1}{2}$	$3\frac{1}{2}$
$2\frac{7}{8}$	11.20	16	$5\frac{1}{4}$	$1\frac{1}{2}$	$3\frac{1}{2}$
$2\frac{15}{16}$	11.60	16	$5\frac{1}{4}$	$1\frac{1}{2}$	$3\frac{1}{2}$
3	12.00	16	$5\frac{1}{4}$	$1\frac{3}{4}$	4

These Reamers will be furnished to order .001 to .010 inch undersize at regular prices.

**No. 119 C.**  
**ROSE CHUCKING REAMERS**  
**WITH STRAIGHT SHANKS.**



**FOR SCREW OR CHUCKING MACHINES.**

Diameter, Inches.	Price Each.	Whole Length, Inches.	Length of Flutes, Inches.	Diameter, of Shank, Inches.	Length of Shank, Inches.
$\frac{1}{4}$	\$1.20	6	$1\frac{1}{2}$	$\frac{1}{4}$	$1\frac{1}{2}$
$\frac{5}{32}$	1.20	6	$1\frac{1}{2}$	$\frac{1}{4}$	$1\frac{1}{2}$
$\frac{3}{16}$	1.30	6	$1\frac{1}{2}$	$\frac{1}{4}$	$1\frac{1}{2}$
$\frac{11}{32}$	1.30	6	$1\frac{1}{2}$	$\frac{1}{4}$	$1\frac{1}{2}$
$\frac{3}{8}$	1.45	7	$1\frac{3}{4}$	$\frac{3}{8}$	$1\frac{3}{4}$
$\frac{13}{32}$	1.50	7	$1\frac{3}{4}$	$\frac{3}{8}$	$1\frac{3}{4}$
$\frac{7}{16}$	1.55	7	$1\frac{3}{4}$	$\frac{3}{8}$	$1\frac{3}{4}$
$\frac{15}{32}$	1.60	7	$1\frac{3}{4}$	$\frac{3}{8}$	$1\frac{3}{4}$
$\frac{1}{2}$	1.65	8	2	$\frac{1}{2}$	2
$\frac{17}{32}$	1.70	8	2	$\frac{1}{2}$	2
$\frac{9}{16}$	1.75	8	2	$\frac{1}{2}$	2
$\frac{19}{32}$	1.80	8	2	$\frac{1}{2}$	2
$\frac{5}{8}$	1.90	9	$2\frac{1}{4}$	$\frac{5}{8}$	$2\frac{1}{4}$
$\frac{21}{32}$	1.95	9	$2\frac{1}{4}$	$\frac{5}{8}$	$2\frac{1}{4}$
$\frac{11}{16}$	2.00	9	$2\frac{1}{4}$	$\frac{5}{8}$	$2\frac{1}{4}$
$\frac{23}{32}$	2.10	9	$2\frac{1}{4}$	$\frac{5}{8}$	$2\frac{1}{4}$
$\frac{3}{4}$	2.20	$9\frac{1}{2}$	$2\frac{1}{2}$	$\frac{3}{4}$	$2\frac{1}{4}$
$\frac{25}{32}$	2.30	$9\frac{1}{2}$	$2\frac{1}{2}$	$\frac{3}{4}$	$2\frac{1}{4}$
$\frac{13}{16}$	2.40	$9\frac{1}{2}$	$2\frac{1}{2}$	$\frac{3}{4}$	$2\frac{1}{4}$
$\frac{27}{32}$	2.50	$9\frac{1}{2}$	$2\frac{1}{2}$	$\frac{3}{4}$	$2\frac{1}{4}$
$\frac{7}{8}$	2.55	10	$2\frac{5}{8}$	$\frac{7}{8}$	$2\frac{1}{2}$
$\frac{29}{32}$	2.60	10	$2\frac{5}{8}$	$\frac{7}{8}$	$2\frac{1}{2}$
$\frac{15}{16}$	2.65	10	$2\frac{5}{8}$	$\frac{7}{8}$	$2\frac{1}{2}$
$\frac{31}{32}$	2.70	10	$2\frac{5}{8}$	$\frac{7}{8}$	$2\frac{1}{2}$
1	2.75	$10\frac{1}{2}$	$2\frac{3}{4}$	1	$2\frac{3}{4}$
$1\frac{1}{32}$	2.80	$10\frac{1}{2}$	$2\frac{3}{4}$	1	$2\frac{3}{4}$
$1\frac{1}{16}$	2.85	$10\frac{1}{2}$	$2\frac{3}{4}$	1	$2\frac{3}{4}$
$1\frac{3}{32}$	2.95	$10\frac{1}{2}$	$2\frac{3}{4}$	1	$2\frac{3}{4}$
$1\frac{1}{8}$	3.10	11	$2\frac{7}{8}$	1	$2\frac{3}{4}$
$1\frac{5}{32}$	3.20	11	$2\frac{7}{8}$	1	$2\frac{3}{4}$
$1\frac{3}{16}$	3.30	11	$2\frac{7}{8}$	1	$2\frac{3}{4}$

**These Reamers** have no radial clearance but are ground with a longitudinal clearance.  
**Keep** cutting points sharp.

**No. 119 C.**  
**ROSE CHUCKING REAMERS**  
**WITH STRAIGHT SHANKS.**



**FOR SCREW OR CHUCKING MACHINES.**

Diameter, Inches.	Price Each.	Whole Length, Inches.	Length of Flutes, Inches.	Diameter of Shank, Inches.	Length, of Shank, Inches.
$1\frac{7}{32}$	\$3.40	11	$2\frac{7}{8}$	1	$2\frac{3}{4}$
$1\frac{1}{4}$	3.50	$11\frac{1}{2}$	3	$1\frac{1}{4}$	3
$1\frac{5}{16}$	3.70	$11\frac{1}{2}$	3	$1\frac{1}{4}$	3
$1\frac{3}{8}$	3.95	12	$3\frac{1}{4}$	$1\frac{1}{4}$	3
$1\frac{7}{8}$	4.15	12	$3\frac{1}{4}$	$1\frac{1}{4}$	3
$1\frac{1}{2}$	4.40	$12\frac{1}{2}$	$3\frac{1}{2}$	$1\frac{1}{4}$	3
$1\frac{9}{16}$	4.60	$12\frac{1}{2}$	$3\frac{1}{2}$	$1\frac{1}{4}$	3
$1\frac{5}{8}$	4.85	13	$3\frac{3}{4}$	$1\frac{1}{4}$	3
$1\frac{11}{16}$	5.10	13	$3\frac{3}{4}$	$1\frac{1}{4}$	3
$1\frac{3}{4}$	5.30	$13\frac{1}{2}$	4	$1\frac{1}{4}$	3
$1\frac{13}{16}$	5.50	$13\frac{1}{2}$	4	$1\frac{1}{4}$	3
$1\frac{7}{8}$	5.70	14	$4\frac{1}{4}$	$1\frac{1}{4}$	3
$1\frac{15}{16}$	5.95	14	$4\frac{1}{4}$	$1\frac{1}{4}$	3
2	6.20	14	$4\frac{1}{4}$	$1\frac{1}{4}$	3
$2\frac{1}{16}$	6.50	$14\frac{1}{2}$	$4\frac{1}{2}$	$1\frac{1}{2}$	$3\frac{1}{2}$
$2\frac{1}{8}$	6.80	$14\frac{1}{2}$	$4\frac{1}{2}$	$1\frac{1}{2}$	$3\frac{1}{2}$
$2\frac{3}{16}$	7.10	$14\frac{1}{2}$	$4\frac{1}{2}$	$1\frac{1}{2}$	$3\frac{1}{2}$
$2\frac{1}{4}$	7.40	$14\frac{1}{2}$	$4\frac{1}{2}$	$1\frac{1}{2}$	$3\frac{1}{2}$
$2\frac{5}{16}$	7.70	15	$4\frac{3}{4}$	$1\frac{1}{2}$	$3\frac{1}{2}$
$2\frac{3}{8}$	8.00	15	$4\frac{3}{4}$	$1\frac{1}{2}$	$3\frac{1}{2}$
$2\frac{7}{16}$	8.40	15	$4\frac{3}{4}$	$1\frac{1}{2}$	$3\frac{1}{2}$
$2\frac{1}{2}$	8.80	15	$4\frac{3}{4}$	$1\frac{1}{2}$	$3\frac{1}{2}$
$2\frac{9}{16}$	9.20	$15\frac{1}{2}$	5	$1\frac{1}{2}$	$3\frac{1}{2}$
$2\frac{5}{8}$	9.60	$15\frac{1}{2}$	5	$1\frac{1}{2}$	$3\frac{1}{2}$
$2\frac{11}{16}$	10.00	$15\frac{1}{2}$	5	$1\frac{1}{2}$	$3\frac{1}{2}$
$2\frac{3}{4}$	10.40	$15\frac{1}{2}$	5	$1\frac{1}{2}$	$3\frac{1}{2}$
$2\frac{13}{16}$	10.80	16	$5\frac{1}{4}$	$1\frac{1}{2}$	$3\frac{1}{2}$
$2\frac{7}{8}$	11.20	16	$5\frac{1}{4}$	$1\frac{1}{2}$	$3\frac{1}{2}$
$2\frac{15}{16}$	11.60	16	$5\frac{1}{4}$	$1\frac{1}{2}$	$3\frac{1}{2}$
3	12.00	16	$5\frac{1}{4}$	$1\frac{3}{4}$	4

These Reamers have no radial clearance but are ground with a longitudinal clearance.  
 Keep cutting points sharp.



### No. 119 D. FLOATING REAMERS.



Diameter, Inches.	Price Each.	Whole Length, Inches.	Length of Flutes, Inches.	Diameter of Bushing, Inches.	Length of Bushing, Inches.
$\frac{5}{8}$	\$6.15	$8\frac{1}{2}$	2	$1\frac{1}{2}$	$3\frac{1}{4}$
$\frac{11}{16}$	6.35	$8\frac{1}{2}$	2	$1\frac{1}{2}$	$3\frac{1}{4}$
$\frac{3}{4}$	6.60	9	2	$1\frac{1}{2}$	$3\frac{1}{4}$
$\frac{13}{16}$	6.80	9	2	$1\frac{1}{2}$	$3\frac{1}{4}$
$\frac{7}{8}$	7.05	$9\frac{1}{2}$	2	$1\frac{1}{2}$	$3\frac{1}{4}$
$\frac{15}{16}$	7.25	10	2	$1\frac{1}{2}$	$3\frac{1}{4}$
1	7.50	$10\frac{1}{2}$	2	$1\frac{1}{2}$	$3\frac{1}{4}$
$1\frac{1}{16}$	7.70	$10\frac{1}{2}$	2	$1\frac{1}{2}$	$3\frac{1}{4}$
$1\frac{1}{8}$	7.95	11	2	$1\frac{1}{2}$	$3\frac{1}{4}$
$1\frac{3}{8}$	8.15	11	2	$1\frac{1}{2}$	$3\frac{1}{4}$

These Reamers are made .003 undersize and are designed to be used in connection with Four-Groove Chucking Reamers No. 120 F-H on page 230 and as a roughing reamer for Floating Expansion Reamers listed below.

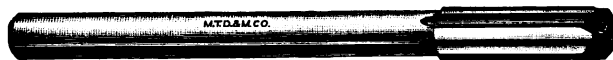
### No. 119 E. FLOATING EXPANSION REAMERS.



Diameter, Inches.	Price Each.	Whole Length, Inches.	Length of Flutes, Inches.	Diameter of Bushing, Inches.	Length of Bushing, Inches.
$\frac{5}{8}$	\$9.15	$8\frac{1}{2}$	$1\frac{7}{8}$	$1\frac{1}{2}$	$3\frac{1}{4}$
$\frac{11}{16}$	9.40	$8\frac{1}{2}$	$1\frac{7}{8}$	$1\frac{1}{2}$	$3\frac{1}{4}$
$\frac{3}{4}$	9.65	9	$1\frac{7}{8}$	$1\frac{1}{2}$	$3\frac{1}{4}$
$\frac{13}{16}$	9.90	9	$1\frac{7}{8}$	$1\frac{1}{2}$	$3\frac{1}{4}$
$\frac{7}{8}$	10.15	$9\frac{1}{2}$	$1\frac{7}{8}$	$1\frac{1}{2}$	$3\frac{1}{4}$
$\frac{15}{16}$	10.50	10	$1\frac{7}{8}$	$1\frac{1}{2}$	$3\frac{1}{4}$
1	10.80	$10\frac{1}{2}$	$1\frac{7}{8}$	$1\frac{1}{2}$	$3\frac{1}{4}$
$1\frac{1}{16}$	11.15	$10\frac{1}{2}$	$2\frac{1}{8}$	$1\frac{1}{2}$	$3\frac{1}{4}$
$1\frac{1}{8}$	11.50	11	$2\frac{1}{8}$	$1\frac{1}{2}$	$3\frac{1}{4}$
$1\frac{3}{8}$	11.85	11	$2\frac{1}{8}$	$1\frac{1}{2}$	$3\frac{1}{4}$

These Reamers are designed to be used as finishing reamers in connection with Floating Reamers listed above and Four-Groove Chucking Reamers listed on page 230.

**No. 120.**  
**ROSE CHUCKING REAMERS**  
 WITH STRAIGHT SHANKS.



Diameter, Inches.	Price Each.	Whole Length, Inches.	Length of Flutes, Inches.	Diameter, Inches.	Price Each.	Whole Length, Inches.	Length of Flutes, Inches.
$\frac{1}{4}$	\$ .80	6	$1\frac{1}{2}$	$1\frac{7}{8}$	\$2.65	11	$2\frac{7}{8}$
$\frac{3}{8}$	.85	6	$1\frac{1}{2}$	$1\frac{1}{4}$	2.70	$11\frac{1}{2}$	3
$\frac{1}{2}$	.90	6	$1\frac{1}{2}$	$1\frac{5}{8}$	2.85	$11\frac{1}{2}$	3
$\frac{5}{8}$	.95	6	$1\frac{1}{2}$	$1\frac{3}{8}$	3.00	12	$3\frac{1}{4}$
$\frac{3}{4}$	1.00	7	$1\frac{3}{4}$	$1\frac{7}{8}$	3.15	12	$3\frac{1}{4}$
$\frac{7}{8}$	1.05	7	$1\frac{3}{4}$	$1\frac{1}{2}$	3.30	$12\frac{1}{2}$	$3\frac{1}{2}$
$1\frac{1}{8}$	1.10	7	$1\frac{3}{4}$	$1\frac{9}{8}$	3.45	$12\frac{1}{2}$	$3\frac{1}{2}$
$1\frac{1}{4}$	1.15	7	$1\frac{3}{4}$	$1\frac{5}{8}$	3.60	13	$3\frac{3}{4}$
$1\frac{1}{2}$	1.20	8	2	$1\frac{11}{8}$	3.75	13	$3\frac{3}{4}$
$1\frac{3}{4}$	1.25	8	2	$1\frac{3}{4}$	3.90	$13\frac{1}{2}$	4
$1\frac{7}{8}$	1.30	8	2	$1\frac{13}{8}$	4.05	$13\frac{1}{2}$	4
$2\frac{1}{8}$	1.35	8	2	$1\frac{7}{8}$	4.20	14	$4\frac{1}{4}$
$2\frac{1}{4}$	1.40	9	$2\frac{1}{4}$	$1\frac{15}{8}$	4.40	14	$4\frac{1}{4}$
$2\frac{1}{2}$	1.45	9	$2\frac{1}{4}$	2	4.60	14	$4\frac{1}{4}$
$2\frac{3}{4}$	1.50	9	$2\frac{1}{4}$	$2\frac{1}{8}$	4.90	$14\frac{1}{2}$	$4\frac{1}{2}$
$2\frac{7}{8}$	1.55	9	$2\frac{1}{4}$	$2\frac{1}{4}$	5.20	$14\frac{1}{2}$	$4\frac{1}{2}$
$3\frac{1}{8}$	1.60	$9\frac{1}{2}$	$2\frac{1}{2}$	$2\frac{3}{8}$	5.50	$14\frac{1}{2}$	$4\frac{1}{2}$
$3\frac{1}{4}$	1.65	$9\frac{1}{2}$	$2\frac{1}{2}$	$2\frac{1}{2}$	5.80	$14\frac{1}{2}$	$4\frac{1}{2}$
$3\frac{1}{2}$	1.70	$9\frac{1}{2}$	$2\frac{1}{2}$	$2\frac{5}{8}$	6.10	15	$4\frac{3}{4}$
$3\frac{3}{4}$	1.75	$9\frac{1}{2}$	$2\frac{1}{2}$	$2\frac{3}{4}$	6.40	15	$4\frac{3}{4}$
$4\frac{1}{8}$	1.80	10	$2\frac{5}{8}$	$2\frac{7}{8}$	6.80	15	$4\frac{3}{4}$
$4\frac{1}{4}$	1.90	10	$2\frac{5}{8}$	$2\frac{1}{2}$	7.20	15	$4\frac{3}{4}$
$4\frac{1}{2}$	1.95	10	$2\frac{5}{8}$	$2\frac{9}{8}$	7.50	$15\frac{1}{2}$	5
$4\frac{3}{4}$	2.05	10	$2\frac{5}{8}$	$2\frac{5}{8}$	7.80	$15\frac{1}{2}$	5
5	2.10	$10\frac{1}{2}$	$2\frac{3}{4}$	$2\frac{11}{8}$	8.10	$15\frac{1}{2}$	5
$5\frac{1}{4}$	2.20	$10\frac{1}{2}$	$2\frac{3}{4}$	$2\frac{3}{4}$	8.40	$15\frac{1}{2}$	5
$5\frac{1}{2}$	2.25	$10\frac{1}{2}$	$2\frac{3}{4}$	$2\frac{13}{8}$	8.80	16	$5\frac{1}{4}$
$5\frac{3}{4}$	2.35	$10\frac{1}{2}$	$2\frac{3}{4}$	$2\frac{7}{8}$	9.20	16	$5\frac{1}{4}$
$6\frac{1}{8}$	2.40	11	$2\frac{7}{8}$	$2\frac{15}{8}$	9.60	16	$5\frac{1}{4}$
$6\frac{1}{4}$	2.50	11	$2\frac{7}{8}$	3	10.00	16	$5\frac{1}{4}$
$6\frac{1}{2}$	2.55	11	$2\frac{7}{8}$				

Special attention is called to Rose Chucking Reamers illustrated on pages 189-190. These Reamers have no radial clearance but are ground with a longitudinal clearance. Keep cutting points sharp.

## No. 120 ½.

## ROSE CHUCKING REAMERS

WITH MORSE TAPER SHANKS.



Diam., Inches.	Price Each.	Whole Length, Inches.	Length of Flutes Inches.	Morse Taper Shank.	Diam., Inches.	Price Each.	Whole Length, Inches.	Length of Flutes Inches.	Morse Taper Shank.
1/4	\$1.20	6	1 1/2	No. 1.	1 3/16	\$3.30	11	2 7/8	No. 3
3/8	1.20	6	1 1/2		1 3/8	3.40	11	2 7/8	
1/2	1.30	6	1 1/2		1 1/4	3.50	11 1/2	3	No. 4.
5/8	1.30	6	1 1/2		1 5/8	3.70	11 1/2	3	
3/4	1.45	7	1 3/4		1 3/8	3.95	12	3 1/4	
7/8	1.50	7	1 3/4		1 7/8	4.15	12	3 1/4	
1	1.55	7	1 3/4		1 1/2	4.40	12 1/2	3 1/2	
1 1/8	1.60	7	1 3/4		1 5/8	4.60	12 1/2	3 1/2	
1 1/4	1.65	8	2		1 3/4	4.85	13	3 3/4	
1 1/2	1.70	8	2		1 7/8	5.10	13	3 3/4	
1 3/4	1.75	8	2		2	5.30	13 1/2	4	
1 7/8	1.80	8	2		2 1/8	5.50	13 1/2	4	
2				No. 2.	2 1/4	5.70	14	4 1/4	No. 5.
2 1/8	1.90	9	2 1/4		2 3/8	5.95	14	4 1/4	
2 1/4	1.95	9	2 1/4		2 1/2	6.20	14	4 1/4	
2 3/8	2.00	9	2 1/4		2 5/8	6.50	14 1/2	4 1/2	
2 1/2	2.10	9	2 1/2		2 3/4	6.80	14 1/2	4 1/2	
2 3/4	2.20	9 1/2	2 1/2		2 7/8	7.10	14 1/2	4 1/2	
2 7/8	2.30	9 1/2	2 1/2		3	7.40	14 1/2	4 1/2	
3	2.40	9 1/2	2 1/2		3 1/8	7.70	15	4 3/4	
3 1/8	2.50	9 1/2	2 1/2		3 1/4	8.00	15	4 3/4	
3 1/4	2.55	10	2 5/8		3 1/2	8.40	15	4 3/4	
3 1/2	2.60	10	2 5/8	No. 3.	3 3/4	8.80	15	4 3/4	
3 3/8					3 7/8	9.20	15 1/2	5	
3 7/8	2.65	10	2 5/8		4	9.60	15 1/2	5	
4	2.70	10	2 5/8		4 1/8	10.00	15 1/2	5	
4 1/8	2.75	10 1/2	2 3/4		4 1/4	10.40	15 1/2	5	
4 1/4	2.80	10 1/2	2 3/4		4 3/8	10.80	16	5 1/4	
4 3/8	2.85	10 1/2	2 3/4		4 1/2	11.20	16	5 1/4	
4 1/2	2.95	10 1/2	2 3/4		4 5/8	11.60	16	5 1/4	
4 5/8	3.10	11	2 7/8		5	12.00	16	5 1/4	
5	3.20	11	2 7/8						

These Reamers have no radial clearance but are ground with a longitudinal clearance. Keep cutting points sharp.

## No. 120 A.

## LOCOMOTIVE TAPER REAMERS.



Taper either  $\frac{1}{16}$  inch or  $\frac{3}{32}$  inch per foot.

Unless otherwise specified on orders  $\frac{1}{16}$  inch taper will be furnished.

Diameter. 1-2 In. from Small End, Inches.	Price Each.	Whole Length, Inches.	Length of Flutes Inches.	Diameter 1-2 In. from Small End, Inches.	Price Each.	Whole Length, Inches.	Length of Flutes, Inches.
$\frac{1}{4}$	\$2.20	$5\frac{5}{16}$	4	$1\frac{1}{8}$	\$5.70	$11\frac{1}{4}$	9
$\frac{3}{8}$	2.20	$5\frac{5}{16}$	4	$1\frac{1}{8}$	6.20	$12\frac{1}{4}$	10
$\frac{5}{16}$	2.25	$5\frac{5}{16}$	4	$1\frac{3}{16}$	6.60	$12\frac{1}{4}$	10
$\frac{11}{32}$	2.25	$5\frac{5}{16}$	4	$1\frac{1}{4}$	7.00	$12\frac{1}{4}$	10
$\frac{3}{8}$	2.30	$6\frac{5}{16}$	5	$1\frac{5}{16}$	7.60	$14\frac{1}{2}$	12
$\frac{13}{32}$	2.40	$6\frac{5}{16}$	5	$1\frac{3}{8}$	8.00	$14\frac{1}{2}$	12
$\frac{7}{16}$	2.55	$7\frac{5}{16}$	6	$1\frac{7}{16}$	8.50	$14\frac{1}{2}$	12
$\frac{15}{32}$	2.70	$7\frac{5}{16}$	6	$1\frac{1}{2}$	9.00	$14\frac{1}{2}$	12
$\frac{1}{2}$	3.00	$8\frac{5}{8}$	7	$1\frac{9}{16}$	9.60	$16\frac{1}{2}$	14
$\frac{9}{16}$	3.20	$9\frac{7}{8}$	8	$1\frac{5}{8}$	10.20	$16\frac{1}{2}$	14
$\frac{5}{8}$	3.50	$9\frac{7}{8}$	8	$1\frac{11}{16}$	10.85	$16\frac{1}{2}$	14
$\frac{11}{8}$	3.80	$9\frac{7}{8}$	8	$1\frac{3}{4}$	11.60	$16\frac{1}{2}$	14
$\frac{3}{4}$	4.10	$9\frac{7}{8}$	8	$1\frac{13}{16}$	12.40	$18\frac{1}{2}$	16
$\frac{13}{8}$	4.50	$11\frac{1}{4}$	9	$1\frac{7}{8}$	14.00	$18\frac{1}{2}$	16
$\frac{7}{8}$	4.80	$11\frac{1}{4}$	9	$1\frac{15}{16}$	15.00	$18\frac{1}{2}$	16
$\frac{15}{8}$	5.10	$11\frac{1}{4}$	9	2	16.00	$18\frac{1}{2}$	16
1	5.40	$11\frac{1}{4}$	9				

To prevent errors in filling orders always specify taper desired.

Reamers of other taper per foot than as specified above furnished as desired. These Reamers have an increased taper at the end, one-half inch in length.

Special sizes made to order at special prices.

**No. 120½A.**  
**LOCOMOTIVE TAPER REAMERS**  
 WITH MORSE TAPER SHANKS.



Taper either  $\frac{1}{16}$  inch or  $\frac{3}{32}$  inch per foot.

Unless otherwise specified on orders  $\frac{1}{8}$  inch taper will be furnished.

Diameter 1-2 Inch from Small End, Inches.	Price Each.	Whole Length, Inches.	Length of Flutes, Inches.	Morse Taper Shank.
$\frac{1}{4}$	\$3.10	$7\frac{5}{16}$	4	No. 1.
$\frac{9}{32}$	3.10	$7\frac{5}{16}$	4	
$\frac{1}{16}$	3.15	$7\frac{5}{16}$	4	
$\frac{11}{32}$	3.15	$7\frac{5}{16}$	4	
$\frac{3}{8}$	3.20	$8\frac{5}{16}$	5	
$\frac{13}{32}$	3.25	$8\frac{5}{16}$	5	No. 2.
$\frac{7}{16}$	3.30	$9\frac{5}{16}$	6	
$\frac{15}{32}$	3.45	$9\frac{5}{16}$	6	
$\frac{1}{2}$	3.50	$10\frac{5}{16}$	7	
$\frac{9}{16}$	3.50	$11\frac{5}{16}$	8	
$\frac{5}{8}$	4.00	$11\frac{13}{16}$	8	No. 3.
$\frac{11}{16}$	4.50	$11\frac{13}{16}$	8	
$\frac{3}{4}$	4.90	$11\frac{13}{16}$	8	
$\frac{13}{16}$	5.30	$12\frac{13}{16}$	9	
$\frac{7}{8}$	5.70	$12\frac{13}{16}$	9	
$\frac{15}{16}$	6.05	$13\frac{1}{2}$	9	No. 4.
1	6.40	$13\frac{1}{2}$	9	
$1\frac{1}{16}$	6.60	$13\frac{1}{2}$	9	
$1\frac{1}{8}$	6.80	$14\frac{1}{2}$	10	
$1\frac{3}{16}$	7.25	$14\frac{1}{2}$	10	
$1\frac{1}{4}$	7.70	$15\frac{1}{2}$	10	No. 5.
$1\frac{5}{16}$	8.35	$17\frac{1}{2}$	12	
$1\frac{3}{8}$	8.80	$17\frac{1}{2}$	12	
$1\frac{7}{16}$	9.35	$17\frac{1}{2}$	12	
$1\frac{1}{2}$	9.90	$17\frac{1}{2}$	12	
$1\frac{9}{16}$	10.55	$19\frac{1}{2}$	14	No. 5.
$1\frac{5}{8}$	11.20	$19\frac{1}{2}$	14	
$1\frac{11}{16}$	11.95	$19\frac{1}{2}$	14	
$1\frac{3}{4}$	12.75	$20\frac{3}{4}$	14	
$1\frac{13}{16}$	13.65	$22\frac{3}{4}$	16	
$1\frac{7}{8}$	14.60	$22\frac{3}{4}$	16	No. 5.
$1\frac{15}{16}$	15.70	$22\frac{3}{4}$	16	
2	16.80	$22\frac{3}{4}$	16	

To prevent errors in filling orders always specify taper desired.

Reamers of other taper per foot than as specified above furnished as desired. These Reamers have an increased taper at the end, one-half inch in length.

Special sizes made to order at special prices.

## No. 120 B.

## BIT STOCK TAPER REAMERS.



Taper 1 inch to the foot. Diameter at large end of flutes is  $\frac{1}{16}$  inch larger than nominal size.

Nominal Size, Inches.	Price Each.	Whole Length, Inches.	Length of Flutes, Inches.	Diameter Small End, Inches.	Diameter Large End, Inches.
$\frac{1}{8}$	\$ .35	$3\frac{3}{4}$	$1\frac{5}{8}$	.052	$\frac{3}{16}$
$\frac{3}{16}$	.35	$3\frac{7}{8}$	$1\frac{3}{4}$	.104	$\frac{1}{4}$
$\frac{1}{4}$	.45	4	$1\frac{7}{8}$	.156	$\frac{5}{16}$
$\frac{5}{16}$	.50	$4\frac{1}{8}$	2	.208	$\frac{3}{8}$
$\frac{3}{8}$	.55	$4\frac{1}{4}$	$2\frac{1}{8}$	.260	$\frac{7}{16}$
$\frac{7}{16}$	.60	$4\frac{3}{8}$	$2\frac{1}{4}$	.313	$\frac{1}{2}$
$\frac{1}{2}$	.70	$4\frac{1}{2}$	$2\frac{3}{8}$	.365	$\frac{9}{16}$
$\frac{9}{16}$	.80	$4\frac{5}{8}$	$2\frac{1}{2}$	.417	$\frac{5}{8}$
$\frac{5}{8}$	.90	$4\frac{3}{4}$	$2\frac{5}{8}$	.469	$\frac{11}{16}$
$\frac{11}{16}$	1.05	$4\frac{7}{8}$	$2\frac{3}{4}$	.521	$\frac{3}{4}$
$\frac{3}{4}$	1.20	5	$2\frac{7}{8}$	.573	$\frac{13}{16}$
$\frac{13}{16}$	1.40	$5\frac{1}{8}$	3	.626	$\frac{7}{8}$
$\frac{7}{8}$	1.60	$5\frac{1}{4}$	$3\frac{1}{8}$	.677	$\frac{15}{16}$
$\frac{15}{16}$	1.80	$5\frac{3}{8}$	$3\frac{1}{4}$	.730	1
1	2.00	$5\frac{1}{2}$	$3\frac{3}{8}$	.782	$1\frac{1}{16}$
$1\frac{1}{16}$	2.20	$5\frac{5}{8}$	$3\frac{1}{2}$	.833	$1\frac{1}{8}$
$1\frac{1}{8}$	2.40	$5\frac{3}{4}$	$3\frac{5}{8}$	.886	$1\frac{3}{8}$
$1\frac{3}{16}$	2.60	$5\frac{7}{8}$	$3\frac{3}{4}$	.938	$1\frac{1}{4}$
$1\frac{1}{4}$	2.80	6	$3\frac{7}{8}$	.990	$1\frac{5}{16}$
$1\frac{5}{16}$	3.00	$6\frac{1}{8}$	4	1.042	$1\frac{3}{8}$
$1\frac{3}{8}$	3.20	$6\frac{1}{4}$	$4\frac{1}{8}$	1.094	$1\frac{7}{16}$
$1\frac{7}{16}$	3.40	$6\frac{3}{8}$	$4\frac{1}{4}$	1.146	$1\frac{1}{2}$
$1\frac{1}{2}$	3.60	$6\frac{1}{2}$	$4\frac{3}{8}$	1.198	$1\frac{5}{8}$

No. 120  $\frac{1}{2}$  B.

## STRAIGHT SHANK TAPER REAMERS.



Taper 1 inch to the foot. Diameter at large end of flutes is  $\frac{1}{16}$  inch larger than nominal size.

STRAIGHT SHANKS  $\frac{1}{2}$  INCH DIAMETER BY 2 INCHES LONG.

Nominal Size, Inches.	Price Each.	Whole Length, Inches.	Length of Flutes, Inches.	Diameter Small End, Inches.	Diameter Large End, Inches.
$\frac{1}{8}$	\$ .35	4	$1\frac{5}{8}$	.052	$\frac{3}{16}$
$\frac{3}{16}$	.35	$4\frac{1}{4}$	$1\frac{3}{4}$	.104	$\frac{1}{4}$
$\frac{1}{4}$	.45	$4\frac{3}{4}$	$1\frac{7}{8}$	.156	$\frac{5}{16}$
$\frac{5}{16}$	.50	$4\frac{7}{8}$	2	.208	$\frac{3}{8}$
$\frac{3}{8}$	.55	5	$2\frac{1}{8}$	.260	$\frac{7}{16}$
$\frac{7}{16}$	.60	$5\frac{1}{8}$	$2\frac{1}{4}$	.313	$\frac{1}{2}$
$\frac{1}{2}$	.70	$5\frac{1}{4}$	$2\frac{3}{8}$	.365	$\frac{9}{16}$
$\frac{9}{16}$	.80	$5\frac{3}{8}$	$2\frac{1}{2}$	.417	$\frac{5}{8}$
$\frac{5}{8}$	.90	$5\frac{1}{2}$	$2\frac{5}{8}$	.469	$\frac{11}{16}$
$\frac{11}{16}$	1.05	$5\frac{5}{8}$	$2\frac{3}{4}$	.521	$\frac{3}{4}$
$\frac{3}{4}$	1.20	$5\frac{3}{4}$	$2\frac{7}{8}$	.573	$\frac{13}{16}$
$\frac{13}{16}$	1.40	$5\frac{7}{8}$	3	.626	$\frac{7}{8}$
$\frac{7}{8}$	1.60	6	$3\frac{1}{8}$	.677	$\frac{15}{16}$
$\frac{15}{16}$	1.80	$6\frac{1}{8}$	$3\frac{1}{4}$	.730	1
1	2.00	$6\frac{1}{4}$	$3\frac{3}{8}$	.782	$1\frac{1}{16}$
$1\frac{1}{16}$	2.20	$6\frac{3}{8}$	$3\frac{1}{2}$	.833	$1\frac{1}{8}$
$1\frac{1}{8}$	2.40	$6\frac{1}{2}$	$3\frac{5}{8}$	.886	$1\frac{3}{8}$
$1\frac{3}{16}$	2.60	$6\frac{5}{8}$	$3\frac{3}{4}$	.938	$1\frac{1}{4}$
$1\frac{1}{4}$	2.80	$6\frac{3}{4}$	$3\frac{7}{8}$	.990	$1\frac{5}{16}$
$1\frac{5}{16}$	3.00	$6\frac{7}{8}$	4	1.042	$1\frac{3}{8}$
$1\frac{3}{8}$	3.20	7	$4\frac{1}{8}$	1.094	$1\frac{7}{16}$
$1\frac{7}{16}$	3.40	$7\frac{1}{8}$	$4\frac{1}{4}$	1.146	$1\frac{1}{2}$
$1\frac{1}{2}$	3.60	$7\frac{1}{4}$	$4\frac{3}{8}$	1.198	$1\frac{9}{16}$

## No. 120 C.

## TAPER BRIDGE REAMERS.



Diameter, Inches at			Price Each	Whole Length, Inches.	Length of Flutes, Inches.	Length from B to C, Inches.
A	B	C				
$\frac{5}{16}$	$\frac{1}{4}$	$\frac{3}{16}$	\$2.75	$5\frac{3}{4}$	$4\frac{1}{4}$	$1\frac{1}{8}$
$\frac{3}{8}$	$\frac{5}{16}$	$\frac{1}{4}$	2.75	$5\frac{3}{4}$	$4\frac{1}{4}$	$1\frac{1}{8}$
$\frac{7}{16}$	$\frac{3}{8}$	$\frac{5}{16}$	2.75	$5\frac{3}{4}$	$4\frac{1}{4}$	$1\frac{1}{8}$
$\frac{1}{2}$	$\frac{7}{16}$	$\frac{3}{8}$	2.75	$5\frac{3}{4}$	$4\frac{1}{4}$	$1\frac{1}{8}$
$\frac{9}{16}$	$\frac{1}{2}$	$\frac{5}{8}$	2.80	$9\frac{1}{2}$	7	2
$\frac{5}{8}$	$\frac{1}{2}$	$\frac{3}{4}$	2.90	$9\frac{1}{2}$	7	2
$\frac{11}{16}$	$\frac{1}{2}$	$\frac{3}{4}$	3.00	$9\frac{1}{2}$	7	2
$\frac{3}{4}$	$\frac{1}{2}$	$\frac{1}{2}$	3.10	$9\frac{1}{2}$	7	2
$\frac{13}{16}$	$\frac{1}{2}$	$\frac{3}{4}$	3.30	$9\frac{1}{2}$	7	2
$\frac{7}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	3.50	$9\frac{1}{2}$	7	2
$\frac{15}{16}$	$\frac{1}{2}$	$\frac{3}{4}$	3.70	$9\frac{1}{2}$	7	2
1	$\frac{1}{2}$	$\frac{3}{4}$	3.90	$9\frac{1}{2}$	7	2
$1\frac{1}{16}$	$\frac{1}{2}$	$\frac{3}{4}$	4.00	$9\frac{1}{2}$	7	2
$1\frac{1}{8}$	$\frac{1}{2}$	$\frac{3}{4}$	4.30	$9\frac{1}{2}$	7	2
$1\frac{3}{16}$	$\frac{1}{2}$	$\frac{3}{4}$	4.60	$9\frac{1}{2}$	7	2
$1\frac{1}{4}$	$\frac{1}{2}$	1	4.90	$9\frac{1}{2}$	7	2
$1\frac{5}{16}$	$\frac{1}{2}$	$1\frac{1}{8}$	5.20	$9\frac{1}{2}$	7	2
$1\frac{3}{8}$	$\frac{1}{2}$	$1\frac{1}{8}$	5.60	$9\frac{1}{2}$	7	2
$1\frac{7}{16}$	$\frac{1}{2}$	$1\frac{3}{8}$	6.00	$9\frac{1}{2}$	7	2
$1\frac{1}{2}$	$1\frac{1}{4}$	$1\frac{1}{4}$	6.40	$9\frac{1}{2}$	7	2

Special sizes made to order at special prices.

For Taper Reamers especially designed for use in Structural Iron and Steel, Boiler Plate, etc., where precision is not required, see No. 120 R and 120 S on pages 239-240.



# No. 120½ C. TAPER BRIDGE REAMERS

WITH MORSE TAPER SHANKS.



Diameter Inches at A B C			Price Each.	Whole Length, Inches.	Length of Flutes, Inches.	Length From B to C, Inches.	Morse Taper Shank.
5/16	1/4	3/8	\$2.75	7 9/16	4 1/4	1 1/8	No. 1.
3/8	5/16	1/2	2.75	7 9/16	4 1/4	1 1/8	
7/16	3/8	5/8	2.75	7 9/16	4 1/4	1 1/8	
1/2	7/16	3/4	2.75	7 9/16	4 1/4	1 1/8	
9/16	1 1/16	5/8	2.80	10 5/16	7	2	
5/8	1 1/16	3/4	2.90	10 7/8	7	2	No. 2.
11/16	1 1/8	7/8	3.00	10 7/8	7	2	
3/4	1 1/8	1 1/2	3.10	10 7/8	7	2	
13/16	1 1/8	1 1/8	3.30	10 7/8	7	2	
7/8	1 1/8	5/8	3.50	10 7/8	7	2	
15/16	1 3/4	1 1/8	3.70	11 5/8	7	2	No. 3.
1	1 3/4	3/4	3.90	11 5/8	7	2	
1 1/16	1 3/4	1 1/8	4.00	11 5/8	7	2	
1 1/8	1 3/4	7/8	4.30	11 5/8	7	2	
1 3/16	1 3/4	1 1/8	4.60	11 5/8	7	2	
1 1/4	1 5/8	1	4.90	12 5/8	7	2	No. 4.
1 5/8	1 3/4	1 1/8	5.20	12 5/8	7	2	
1 3/8	1 3/4	1 1/8	5.60	12 5/8	7	2	
1 7/8	1 1/2	1 3/8	6.00	12 5/8	7	2	
1 1/2	1 1/2	1 1/4	6.40	12 5/8	7	2	

Special sizes made to order at special prices.

For Taper Reamers especially designed for use in Structural Iron and Steel, Boiler Plate, etc., where precision is not required see No. 120 R and 120 S on pages 239-240.

## No. 120 D.

## TAPER-PIN REAMERS

Taper  $\frac{1}{4}$  inch per foot.

Size Number.	Price Each.	Diameter at Small End, Inches.	Whole Length, Inches.	Length of Flutes Inches.
0	\$1.00	.135	2 $\frac{1}{4}$	1 $\frac{1}{2}$
1	1.00	.146	2 $\frac{1}{2}$	1 $\frac{3}{4}$
2	1.25	.162	3	2
3	1.50	.183	3 $\frac{1}{2}$	2 $\frac{1}{4}$
4	1.75	.208	4	2 $\frac{1}{2}$
5	2.00	.240	4 $\frac{1}{2}$	3
6	2.25	.279	5	3 $\frac{5}{8}$
7	2.50	.331	6	4 $\frac{1}{2}$
8	3.00	.398	6 $\frac{3}{4}$	5 $\frac{1}{4}$
9	3.50	.482	8	6 $\frac{1}{8}$
10	4.00	.581	9	7
11	4.75	.706	11 $\frac{1}{4}$	8 $\frac{1}{4}$
12	5.50	.842	13 $\frac{3}{8}$	10
13	6.50	1.009	16	12
14	7.75	1.250	18 $\frac{1}{4}$	14

These Reamers have the same taper, and each will overlay in convenient measure the next size smaller.

Special sizes made to order at special prices.

For Taper Pins see page 258.

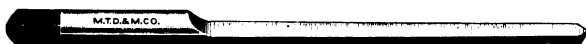
**No. 120 D-A.****TAPER-PIN REAMERS****WITH MORSE TAPER SHANKS.**Taper  $\frac{1}{4}$  inch per foot.

Size Number.	Price Each.	Diameter at Small End, Inches.	Whole Length, Inches.	Length of Flutes, Inches.	Morse Taper Shank.
0	\$2.15	.135	$4\frac{3}{8}$	$1\frac{1}{2}$	1
1	2.25	.146	$4\frac{5}{8}$	$1\frac{3}{4}$	1
2	2.40	.162	$4\frac{7}{8}$	2	1
3	2.50	.183	$5\frac{1}{8}$	$2\frac{1}{4}$	1
4	2.65	.208	$5\frac{1}{2}$	$2\frac{1}{2}$	1
5	2.85	.240	6	3	1
6	3.30	.279	$6\frac{3}{4}$	$3\frac{5}{8}$	1
7	3.60	.331	$7\frac{5}{8}$	$4\frac{1}{2}$	1
8	3.95	.398	$8\frac{3}{8}$	$5\frac{1}{4}$	1
9	4.20	.482	$9\frac{1}{4}$	$6\frac{1}{8}$	1
10	4.75	.581	$10\frac{7}{8}$	7	2
11	5.70	.706	$12\frac{1}{8}$	$8\frac{1}{4}$	2
12	7.60	.842	$14\frac{5}{8}$	10	3
13	9.65	1.009	$17\frac{5}{8}$	12	4
14	13.10	1.250	$19\frac{5}{8}$	14	4

These Reamers have the same taper, and each will overlay in convenient measure the next size smaller.

Special sizes made to order at special prices.

For Taper Pins see page 258.

**No. 120 D-E.****HALF ROUND TAPER-PIN REAMERS.**Taper  $\frac{1}{4}$  inch per foot

Size Number.	Price Each.	Diameter at Small End, Inches.	Whole Length, Inches.	Length of Body, Inches.
0	\$1.00	.135	2 $\frac{1}{4}$	1 $\frac{1}{2}$
1	1.00	.146	2 $\frac{1}{2}$	1 $\frac{3}{4}$
2	1.25	.162	3	2
3	1.50	.183	3 $\frac{1}{2}$	2 $\frac{1}{4}$
4	1.75	.208	4	2 $\frac{1}{2}$
5	2.00	.240	4 $\frac{1}{2}$	3
6	2.25	.279	5	3 $\frac{5}{8}$
7	2.50	.331	6	4 $\frac{1}{2}$
8	3.00	.398	6 $\frac{3}{4}$	5 $\frac{1}{4}$
9	3.50	.482	8	6 $\frac{1}{8}$
10	4.00	.581	9	7
11	4.75	.706	11 $\frac{1}{4}$	8 $\frac{1}{4}$
12	5.50	.842	13 $\frac{3}{8}$	10
13	6.50	1.009	16	12
14	7.75	1.250	18 $\frac{1}{4}$	14

These Reamers have the same taper, and each will overlay in convenient measure the next size smaller.

Special sizes made to order at special prices.

For Taper Pins see page 258.

## No. 120 E.

## ADJUSTABLE REAMERS.



A Wrench furnished with each Reamer.

Diameter, Inches.	Price Each.	Whole Length, Inches.	Diameter, Inches.	Price Each.	Whole Length, Inches.
1	\$5.90	9	2 <sup>5</sup> / <sub>16</sub>	19.50	14
1 <sup>1</sup> / <sub>16</sub>	6.20	10	2 <sup>3</sup> / <sub>8</sub>	21.00	14
1 <sup>1</sup> / <sub>8</sub>	6.50	10	2 <sup>7</sup> / <sub>16</sub>	22.50	14
1 <sup>3</sup> / <sub>16</sub>	6.80	10	2 <sup>1</sup> / <sub>2</sub>	24.00	14
1 <sup>1</sup> / <sub>4</sub>	7.10	10	2 <sup>9</sup> / <sub>16</sub>	25.00	14 <sup>1</sup> / <sub>2</sub>
1 <sup>5</sup> / <sub>16</sub>	7.40	11	2 <sup>5</sup> / <sub>8</sub>	26.00	14 <sup>1</sup> / <sub>2</sub>
1 <sup>3</sup> / <sub>8</sub>	7.80	11	2 <sup>1</sup> / <sub>2</sub>	27.00	14 <sup>1</sup> / <sub>2</sub>
1 <sup>7</sup> / <sub>16</sub>	8.20	11	2 <sup>3</sup> / <sub>4</sub>	28.00	14 <sup>1</sup> / <sub>2</sub>
1 <sup>1</sup> / <sub>2</sub>	8.60	11	2 <sup>1</sup> / <sub>2</sub>	28.75	15
1 <sup>5</sup> / <sub>8</sub>	9.00	12	2 <sup>7</sup> / <sub>8</sub>	29.50	15
1 <sup>5</sup> / <sub>8</sub>	9.30	12	2 <sup>1</sup> / <sub>2</sub>	30.75	15
1 <sup>1</sup> / <sub>2</sub>	9.60	12	3	32.00	15
1 <sup>3</sup> / <sub>4</sub>	9.90	12	3 <sup>1</sup> / <sub>8</sub>	36.00	15 <sup>1</sup> / <sub>2</sub>
1 <sup>1</sup> / <sub>2</sub>	10.20	13	3 <sup>1</sup> / <sub>4</sub>	40.00	15 <sup>1</sup> / <sub>2</sub>
1 <sup>7</sup> / <sub>8</sub>	10.40	13	3 <sup>3</sup> / <sub>8</sub>	44.00	16
1 <sup>1</sup> / <sub>2</sub>	10.60	13	3 <sup>1</sup> / <sub>2</sub>	48.50	16
2	10.80	13	3 <sup>5</sup> / <sub>8</sub>	53.50	16 <sup>1</sup> / <sub>2</sub>
2 <sup>1</sup> / <sub>16</sub>	11.80	13 <sup>1</sup> / <sub>2</sub>	3 <sup>3</sup> / <sub>4</sub>	58.50	16 <sup>1</sup> / <sub>2</sub>
2 <sup>1</sup> / <sub>8</sub>	12.80	13 <sup>1</sup> / <sub>2</sub>	3 <sup>7</sup> / <sub>8</sub>	63.50	17
2 <sup>1</sup> / <sub>4</sub>	15.60	13 <sup>1</sup> / <sub>2</sub>	4	67.50	17
2 <sup>1</sup> / <sub>4</sub>	18.00	13 <sup>1</sup> / <sub>2</sub>			

A ground, tapered plug, acting upon the chasers, adjusts the Reamer to the size desired.

To operate the plug, the Head Nut should be loosened, and the plug then turned until size desired is obtained. The Head Nut should then be tightened. Reamers. 1 inch diameter will adjust .02 inch; 1 <sup>1</sup>/<sub>16</sub> to 1 <sup>1</sup>/<sub>2</sub> inches adjust <sup>1</sup>/<sub>16</sub> inch; 1 <sup>1</sup>/<sub>8</sub> to 3 inches adjust <sup>1</sup>/<sub>8</sub> inch; 3 <sup>1</sup>/<sub>4</sub> to 4 inches adjust .055 inch.

For illustration and sizes of wrenches fitting these Reamers see page 233.

**No. 120 E-B.****ADJUSTABLE REAMERS.****MILLIMETER SIZES.**

A Wrench furnished with each Reamer.

Diameter, M. M.	Price Each.	Whole Length, M. M.	Diameter M. M.	Price Each.	Whole Length, M. M.
25	\$5.90	229	51	\$11.30	330
26	6.05	229	52	11.80	343
27	6.35	254	53	12.30	343
28	6.50	254	54	14.20	343
29	6.65	254	55	15.60	343
30	6.80	254	56	16.80	343
31	7.10	254	57	18.00	343
32	7.25	254	58	19.50	343
33	7.40	254	59	20.25	356
34	7.60	279	60	21.00	356
35	8.00	279	61	21.75	356
36	8.20	279	62	23.25	356
37	8.40	279	63	24.00	356
38	8.60	279	64	24.50	356
39	9.00	279	65	25.00	368
40	9.15	305	66	26.00	368
41	9.30	305	67	26.50	368
42	9.45	305	68	27.00	368
43	9.60	305	69	27.50	368
44	9.90	305	70	28.40	368
45	10.05	305	71	28.75	381
46	10.20	330	72	29.15	381
47	10.40	330	73	29.50	381
48	10.50	330	74	30.75	381
49	10.60	330	75	31.40	381
50	10.70	330	76	32.00	381

For a general description of these Reamers see No. 120 E page 203.

For illustration and sizes of Wrenches fitting these Reamers see page 233.

**No. 120½ E.****ADJUSTABLE REAMERS**

WITH MORSE TAPER SHANKS.



A Wrench furnished with each Reamer.

Diam., Inches.	Price Each.	Whole Length, Inches.	Morse Taper Shank.	Diam., Inches.	Price Each.	Whole Length, Inches.	Morse Taper Shank.
1	\$7.00	10¼	No. 3.	1½	10.00	12⅛	No. 4.
1⅛	7.40	10¼		1⅞	10.30	12⅛	
1⅝	7.80	10⅝		1⅝	10.60	12⅝	
1¾	8.20	10⅝		1⅞	10.90	12⅝	
1¼	8.60	11⅛	No. 4.	1¾	11.20	13½	No. 5.
1⅝	9.00	11¼		1⅞	11.60	13⅝	
1⅝	9.40	11⅝		1⅞	12.00	14⅛	
1⅞	9.70	11⅝		1⅞	12.40	14⅛	
				2	12.80	14⅛	

For a general description of these Reamers, see No. 120E, page 203.

For illustration and sizes of Wrenches fitting these Reamers see page 233

## No. 120 F.

## THREE-GROOVE CHUCKING REAMERS

WITH MORSE TAPER SHANKS.



These Reamers are specially adapted for enlarging cored holes, and have shank and fluted portion ground on centers to size. Special lengths made to order at special prices.

Diameter, Inches.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.	Morse Taper Shank.
$\frac{1}{4}$	\$1.70	$6\frac{1}{8}$	$2\frac{1}{8}$	No. 1.
$\frac{1}{8}$	1.70	$6\frac{1}{4}$	$2\frac{1}{8}$	
$\frac{9}{32}$	1.70	$6\frac{1}{4}$	$2\frac{1}{8}$	
$\frac{19}{64}$	1.70	$6\frac{3}{8}$	$3\frac{1}{8}$	
$\frac{5}{16}$	1.70	$6\frac{3}{8}$	$3\frac{1}{8}$	
$\frac{21}{64}$	1.70	$6\frac{1}{2}$	$3\frac{3}{8}$	
$\frac{11}{32}$	1.70	$6\frac{1}{2}$	$3\frac{3}{8}$	
$\frac{23}{64}$	1.70	$6\frac{3}{4}$	$3\frac{7}{8}$	
$\frac{3}{8}$	1.70	$6\frac{3}{4}$	$3\frac{7}{8}$	
$\frac{25}{64}$	1.75	7	$3\frac{1}{2}$	
$\frac{13}{32}$	1.75	7	$3\frac{1}{2}$	
$\frac{27}{64}$	1.80	$7\frac{1}{4}$	$3\frac{1}{2}$	
$\frac{7}{16}$	1.80	$7\frac{1}{4}$	$3\frac{1}{2}$	
$\frac{29}{64}$	1.85	$7\frac{1}{2}$	$4\frac{1}{8}$	
$\frac{15}{32}$	1.85	$7\frac{1}{2}$	$4\frac{1}{8}$	
$\frac{31}{64}$	1.90	$7\frac{3}{4}$	$4\frac{7}{8}$	
$\frac{1}{2}$	1.90	$7\frac{3}{4}$	$4\frac{7}{8}$	
$\frac{33}{64}$	1.95	8	$4\frac{1}{2}$	No. 2.
$\frac{17}{32}$	1.95	8	$4\frac{1}{2}$	
$\frac{35}{64}$	2.00	$8\frac{1}{4}$	$4\frac{1}{2}$	
$\frac{9}{16}$	2.00	$8\frac{1}{4}$	$4\frac{1}{2}$	
$\frac{37}{64}$	2.30	$8\frac{1}{2}$	$4\frac{5}{8}$	
$\frac{19}{32}$	2.30	$8\frac{1}{2}$	$4\frac{5}{8}$	
$\frac{39}{64}$	2.60	$8\frac{3}{4}$	$4\frac{7}{8}$	
$\frac{5}{8}$	2.60	$8\frac{3}{4}$	$4\frac{7}{8}$	
$\frac{41}{64}$	2.70	9	$5\frac{1}{8}$	
$\frac{21}{32}$	2.70	9	$5\frac{1}{8}$	



**No. 120 F.**  
**THREE-GROOVE CHUCKING REAMERS.**  
 WITH MORSE TAPER SHANKS.



Diameter, Inches.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.	Morse Taper Shank.
$\frac{1}{16}$	\$2.75	$9\frac{1}{4}$	$5\frac{3}{8}$	No. 2.
$\frac{1}{8}$	2.75	$9\frac{1}{4}$	$5\frac{3}{8}$	
$\frac{1}{4}$	2.85	$9\frac{1}{2}$	$5\frac{5}{8}$	
$\frac{3}{8}$	2.85	$9\frac{1}{2}$	$5\frac{5}{8}$	
$\frac{1}{2}$	2.90	$9\frac{3}{4}$	$5\frac{7}{8}$	
$\frac{5}{8}$	2.90	$9\frac{3}{4}$	$5\frac{7}{8}$	
$\frac{3}{4}$	3.00	$9\frac{7}{8}$	6	
$\frac{7}{8}$	3.00	$9\frac{7}{8}$	6	
$1\frac{1}{16}$	3.05	10	$6\frac{1}{8}$	
$1\frac{1}{8}$	3.05	10	$6\frac{1}{8}$	
$1\frac{1}{4}$	3.15	$10\frac{1}{4}$	$6\frac{3}{8}$	
$1\frac{3}{8}$	3.15	$10\frac{1}{4}$	$6\frac{3}{8}$	
$1\frac{1}{2}$	3.20	$10\frac{1}{2}$	$6\frac{5}{8}$	
$1\frac{5}{8}$	3.20	$10\frac{1}{2}$	$6\frac{5}{8}$	
$1\frac{3}{4}$	3.30	$10\frac{5}{8}$	$6\frac{3}{4}$	
$1\frac{7}{8}$	3.30	$10\frac{5}{8}$	$6\frac{3}{4}$	
$2\frac{1}{16}$	3.40	$10\frac{3}{4}$	$6\frac{1}{8}$	
$2\frac{1}{8}$	3.40	$10\frac{3}{4}$	$6\frac{1}{8}$	
$2\frac{1}{4}$	3.50	$10\frac{7}{8}$	$6\frac{1}{4}$	
$2\frac{3}{8}$	3.50	$10\frac{7}{8}$	$6\frac{1}{4}$	
$2\frac{1}{2}$	3.60	11	$6\frac{3}{8}$	
1	3.60	11	$6\frac{3}{8}$	No. 3.
$1\frac{1}{16}$	3.70	$11\frac{1}{8}$	$6\frac{1}{2}$	
$1\frac{1}{8}$	3.70	$11\frac{1}{8}$	$6\frac{1}{2}$	
$1\frac{1}{4}$	3.80	$11\frac{1}{4}$	$6\frac{5}{8}$	
$1\frac{3}{8}$	3.80	$11\frac{1}{4}$	$6\frac{5}{8}$	
$1\frac{1}{2}$	3.90	$11\frac{1}{2}$	$6\frac{7}{8}$	
$1\frac{5}{8}$	3.90	$11\frac{1}{2}$	$6\frac{7}{8}$	
$1\frac{3}{4}$	4.00	$11\frac{3}{4}$	$7\frac{1}{8}$	
$1\frac{7}{8}$	4.00	$11\frac{3}{4}$	$7\frac{1}{8}$	
$2\frac{1}{16}$	4.25	$11\frac{7}{8}$	$7\frac{1}{4}$	
$2\frac{1}{8}$	4.25	$11\frac{7}{8}$	$7\frac{1}{4}$	
$2\frac{1}{4}$	4.50	12	$7\frac{3}{8}$	
$2\frac{3}{8}$	4.50	12	$7\frac{3}{8}$	

**No. 120 F.**  
**THREE-GROOVE CHUCKING REAMERS**  
**WITH MORSE TAPER SHANKS.**



Diameter, Inches.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.	Morse Taper Shank.
1 $\frac{13}{64}$	\$4.65	12 $\frac{1}{8}$	7 $\frac{1}{2}$	No. 3.
1 $\frac{17}{32}$	4.65	12 $\frac{1}{8}$	7 $\frac{1}{2}$	
1 $\frac{19}{64}$	4.80	12 $\frac{1}{2}$	7 $\frac{7}{8}$	
1 $\frac{1}{4}$	4.80	12 $\frac{1}{2}$	7 $\frac{7}{8}$	
1 $\frac{17}{64}$	5.00	14 $\frac{1}{8}$	8 $\frac{1}{2}$	
1 $\frac{9}{32}$	5.00	14 $\frac{1}{8}$	8 $\frac{1}{2}$	
1 $\frac{19}{64}$	5.20	14 $\frac{1}{4}$	8 $\frac{5}{8}$	
1 $\frac{5}{16}$	5.20	14 $\frac{1}{4}$	8 $\frac{5}{8}$	
1 $\frac{21}{64}$	5.35	14 $\frac{3}{8}$	8 $\frac{3}{4}$	
1 $\frac{11}{32}$	5.35	14 $\frac{3}{8}$	8 $\frac{3}{4}$	
1 $\frac{23}{64}$	5.60	14 $\frac{1}{2}$	8 $\frac{7}{8}$	
1 $\frac{3}{8}$	5.60	14 $\frac{1}{2}$	8 $\frac{7}{8}$	
1 $\frac{25}{64}$	5.80	14 $\frac{5}{8}$	9	
1 $\frac{13}{32}$	5.80	14 $\frac{5}{8}$	9	
1 $\frac{27}{64}$	6.00	14 $\frac{3}{4}$	9 $\frac{1}{8}$	
1 $\frac{7}{16}$	6.00	14 $\frac{3}{4}$	9 $\frac{1}{8}$	
1 $\frac{29}{64}$	6.20	14 $\frac{7}{8}$	9 $\frac{1}{4}$	No. 4.
1 $\frac{15}{32}$	6.20	14 $\frac{7}{8}$	9 $\frac{1}{4}$	
1 $\frac{31}{64}$	6.40	15	9 $\frac{3}{8}$	
1 $\frac{1}{2}$	6.40	15	9 $\frac{3}{8}$	
1 $\frac{33}{64}$	6.65	15	9 $\frac{3}{8}$	
1 $\frac{9}{16}$	6.90	15 $\frac{1}{4}$	9 $\frac{5}{8}$	
1 $\frac{19}{32}$	7.15	15 $\frac{1}{4}$	9 $\frac{5}{8}$	
1 $\frac{5}{8}$	7.40	15 $\frac{1}{2}$	9 $\frac{7}{8}$	
1 $\frac{31}{32}$	7.65	15 $\frac{1}{2}$	9 $\frac{7}{8}$	
1 $\frac{11}{16}$	7.90	15 $\frac{3}{4}$	10 $\frac{1}{8}$	
1 $\frac{33}{32}$	8.15	15 $\frac{3}{4}$	9 $\frac{11}{16}$	
1 $\frac{3}{4}$	8.40	16	9 $\frac{11}{16}$	
1 $\frac{35}{32}$	8.60	16	9 $\frac{11}{16}$	
1 $\frac{13}{8}$	8.80	16 $\frac{1}{4}$	10 $\frac{1}{8}$	
1 $\frac{37}{32}$	9.00	16 $\frac{1}{4}$	10 $\frac{1}{8}$	
1 $\frac{7}{8}$	9.20	16 $\frac{1}{2}$	10 $\frac{3}{8}$	
1 $\frac{39}{32}$	9.35	16 $\frac{1}{2}$	10 $\frac{3}{8}$	
1 $\frac{15}{8}$	9.50	16 $\frac{1}{2}$	10 $\frac{1}{4}$	

64th sizes not listed furnished at price of next larger size.

**No. 120F.**  
**THREE-GROOVE CHUCKING REAMERS**  
 WITH MORSE TAPER SHANKS.



Diameter, Inches.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.	Morse Taper Shank.
1 1/2	\$9.65	16 1/2	10 1/4	} No. 4.
2	9.80	16 1/2	10 1/4	
2 1/2	10.20	16 1/2	9 1/2	
2 7/8	10.60	17	10	
2 3/4	10.90	17	10	
2 1/8	11.20	17	10	
2 5/8	11.60	17	10	
2 3/8	12.00	17	10	
2 7/8	12.40	17 1/2	10 1/2	
2 1/4	12.80	17 1/2	10 1/8	
2 3/2	13.20	17 1/2	10 1/8	
2 5/8	13.60	17 1/2	10 1/8	
2 1/2	14.00	18	10 5/8	
2 3/8	14.40	18	10 1/2	
2 1/2	14.70	18 1/2	11	
2 7/8	15.00	18 1/2	11	} No. 5.
2 3/2	15.30	19	11 1/2	
2 1/2	15.60	19	11 3/8	
2 1/2	15.90	19 1/4	11 5/8	
2 7/8	16.20	19 1/4	11 5/8	
2 3/2	16.50	19 1/2	11 7/8	
2 5/8	16.80	19 1/2	11 3/4	
2 3/2	17.35	20	12 1/4	
2 1/8	17.90	20	12 1/4	
2 3/2	18.45	20 1/2	12 3/4	
2 3/4	19.00	20 1/2	12 5/8	
2 3/2	19.50	20 1/2	12 5/8	
2 1/8	20.00	20 1/2	12 5/8	
2 3/2	20.50	21	13 1/8	
2 7/8	21.00	21	13	
2 3/2	22.00	21	13	
2 1/8	23.00	21	13	
2 3/2	24.00	22	14	
3	25.00	22	13 7/8	

64th sizes not listed furnished at price of next larger size.

**No. 120 F-B.**  
**THREE-GROOVE CHUCKING REAMERS**  
 WITH STRAIGHT SHANKS.



These Reamers are specially adapted for enlarging cored holes, and have shank and fluted portion ground on centers to size. Special lengths made to order at special prices.

Diameter, Inches.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.	Diameter of Shank, Inches.	Length of Shank, Inches.
$\frac{1}{4}$	1.70	$6\frac{1}{8}$	$3\frac{7}{8}$	$\frac{1}{4}$	$1\frac{1}{2}$
$\frac{17}{64}$	1.70	$6\frac{1}{4}$	4	$\frac{1}{4}$	$1\frac{1}{2}$
$\frac{9}{32}$	1.70	$6\frac{1}{4}$	4	$\frac{1}{4}$	$1\frac{1}{2}$
$\frac{19}{64}$	1.70	$6\frac{3}{8}$	$4\frac{1}{8}$	$\frac{1}{4}$	$1\frac{1}{2}$
$\frac{5}{16}$	1.70	$6\frac{3}{8}$	$4\frac{1}{8}$	$\frac{1}{4}$	$1\frac{1}{2}$
$\frac{21}{64}$	1.70	$6\frac{1}{2}$	$4\frac{1}{4}$	$\frac{1}{4}$	$1\frac{1}{2}$
$\frac{11}{32}$	1.70	$6\frac{1}{2}$	$4\frac{1}{4}$	$\frac{1}{4}$	$1\frac{1}{2}$
$\frac{23}{64}$	1.70	$6\frac{3}{4}$	$4\frac{1}{4}$	$\frac{3}{8}$	$1\frac{3}{4}$
$\frac{3}{8}$	1.70	$6\frac{3}{4}$	$4\frac{1}{4}$	$\frac{3}{8}$	$1\frac{3}{4}$
$\frac{25}{64}$	1.75	7	$4\frac{1}{2}$	$\frac{3}{8}$	$1\frac{3}{4}$
$\frac{13}{32}$	1.75	7	$4\frac{1}{2}$	$\frac{3}{8}$	$1\frac{3}{4}$
$\frac{27}{64}$	1.80	$7\frac{1}{4}$	$4\frac{3}{4}$	$\frac{3}{8}$	$1\frac{3}{4}$
$\frac{7}{16}$	1.80	$7\frac{1}{4}$	$4\frac{3}{4}$	$\frac{3}{8}$	$1\frac{3}{4}$
$\frac{29}{64}$	1.85	$7\frac{1}{2}$	5	$\frac{3}{8}$	$1\frac{3}{4}$
$\frac{15}{32}$	1.85	$7\frac{1}{2}$	5	$\frac{3}{8}$	$1\frac{3}{4}$
$\frac{31}{64}$	1.90	$7\frac{3}{4}$	5	$\frac{1}{2}$	2
$\frac{1}{2}$	1.90	$7\frac{3}{4}$	5	$\frac{1}{2}$	2
$\frac{33}{64}$	1.95	8	$5\frac{1}{4}$	$\frac{1}{2}$	2
$\frac{17}{32}$	1.95	8	$5\frac{1}{4}$	$\frac{1}{2}$	2
$\frac{35}{64}$	2.00	$8\frac{1}{4}$	$5\frac{1}{2}$	$\frac{1}{2}$	2
$\frac{9}{16}$	2.00	$8\frac{1}{4}$	$5\frac{1}{2}$	$\frac{1}{2}$	2
$\frac{37}{64}$	2.30	$8\frac{1}{2}$	$5\frac{3}{4}$	$\frac{1}{2}$	2
$\frac{19}{32}$	2.30	$8\frac{1}{2}$	$5\frac{3}{4}$	$\frac{1}{2}$	2
$\frac{39}{64}$	2.60	$8\frac{3}{4}$	$5\frac{3}{4}$	$\frac{5}{8}$	$2\frac{1}{4}$
$\frac{5}{8}$	2.60	$8\frac{3}{4}$	$5\frac{3}{4}$	$\frac{5}{8}$	$2\frac{1}{4}$
$\frac{41}{64}$	2.70	9	6	$\frac{5}{8}$	$2\frac{1}{4}$
$\frac{21}{32}$	2.70	9	6	$\frac{5}{8}$	$2\frac{1}{4}$
$\frac{43}{64}$	2.75	$9\frac{1}{4}$	$6\frac{1}{4}$	$\frac{5}{8}$	$2\frac{1}{4}$

**No. 120 F-B.**  
**THREE-GROOVE CHUCKING REAMERS**  
 WITH STRAIGHT SHANKS.



FOR SCREW OR CHUCKING MACHINES.

Diameter, Inches.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.	Diameter Shank, Inches.	Length Shank, Inches.
$\frac{11}{16}$	\$2.75	$9\frac{1}{4}$	$6\frac{1}{4}$	$\frac{5}{8}$	$2\frac{1}{4}$
$\frac{45}{64}$	2.85	$9\frac{1}{2}$	$6\frac{1}{2}$	$\frac{5}{8}$	$2\frac{1}{4}$
$\frac{33}{32}$	2.85	$9\frac{1}{2}$	$6\frac{1}{2}$	$\frac{5}{8}$	$2\frac{1}{4}$
$\frac{47}{64}$	2.90	$9\frac{3}{4}$	$6\frac{3}{4}$	$\frac{3}{4}$	$2\frac{1}{4}$
$\frac{3}{4}$	2.90	$9\frac{3}{4}$	$6\frac{3}{4}$	$\frac{3}{4}$	$2\frac{1}{4}$
$\frac{49}{64}$	3.00	$9\frac{7}{8}$	$6\frac{7}{8}$	$\frac{3}{4}$	$2\frac{1}{4}$
$\frac{43}{32}$	3.00	$9\frac{7}{8}$	$6\frac{7}{8}$	$\frac{3}{4}$	$2\frac{1}{4}$
$\frac{51}{64}$	3.05	10	7	$\frac{3}{4}$	$2\frac{1}{4}$
$\frac{1}{8}$	3.05	10	7	$\frac{3}{4}$	$2\frac{1}{4}$
$\frac{53}{64}$	3.15	$10\frac{1}{4}$	$7\frac{1}{4}$	$\frac{3}{4}$	$2\frac{1}{4}$
$\frac{47}{32}$	3.15	$10\frac{1}{4}$	$7\frac{1}{4}$	$\frac{3}{4}$	$2\frac{1}{4}$
$\frac{55}{64}$	3.20	$10\frac{1}{2}$	$7\frac{1}{4}$	$\frac{7}{8}$	$2\frac{1}{2}$
$\frac{7}{8}$	3.20	$10\frac{1}{2}$	$7\frac{1}{4}$	$\frac{7}{8}$	$2\frac{1}{2}$
$\frac{57}{64}$	3.30	$10\frac{5}{8}$	$7\frac{3}{8}$	$\frac{7}{8}$	$2\frac{1}{2}$
$\frac{43}{32}$	3.30	$10\frac{5}{8}$	$7\frac{3}{8}$	$\frac{7}{8}$	$2\frac{1}{2}$
$\frac{59}{64}$	3.40	$10\frac{3}{4}$	$7\frac{1}{2}$	$\frac{7}{8}$	$2\frac{1}{2}$
$\frac{1}{8}$	3.40	$10\frac{3}{4}$	$7\frac{1}{2}$	$\frac{7}{8}$	$2\frac{1}{2}$
$\frac{61}{64}$	3.50	$10\frac{7}{8}$	$7\frac{5}{8}$	$\frac{7}{8}$	$2\frac{1}{2}$
$\frac{31}{32}$	3.50	$10\frac{7}{8}$	$7\frac{5}{8}$	$\frac{7}{8}$	$2\frac{1}{2}$
$\frac{63}{64}$	3.60	11	$7\frac{1}{2}$	1	$2\frac{3}{4}$
1	3.60	11	$7\frac{1}{2}$	1	$2\frac{3}{4}$
$1\frac{1}{64}$	3.70	$11\frac{1}{8}$	$7\frac{5}{8}$	1	$2\frac{3}{4}$
$1\frac{1}{32}$	3.70	$11\frac{1}{8}$	$7\frac{5}{8}$	1	$2\frac{3}{4}$
$1\frac{1}{16}$	3.80	$11\frac{1}{4}$	$7\frac{3}{4}$	1	$2\frac{3}{4}$
$1\frac{1}{8}$	3.80	$11\frac{1}{4}$	$7\frac{3}{4}$	1	$2\frac{3}{4}$
$1\frac{5}{64}$	3.90	$11\frac{1}{2}$	8	1	$2\frac{3}{4}$
$1\frac{1}{32}$	3.90	$11\frac{1}{2}$	8	1	$2\frac{3}{4}$
$1\frac{1}{16}$	4.00	$11\frac{3}{4}$	$8\frac{1}{4}$	1	$2\frac{3}{4}$
$1\frac{1}{8}$	4.00	$11\frac{3}{4}$	$8\frac{1}{4}$	1	$2\frac{3}{4}$
$1\frac{3}{16}$	4.25	$11\frac{7}{8}$	$8\frac{3}{8}$	1	$2\frac{3}{4}$
$1\frac{1}{2}$	4.25	$11\frac{7}{8}$	$8\frac{3}{8}$	1	$2\frac{3}{4}$
$1\frac{1}{4}$	4.50	12	$8\frac{1}{2}$	1	$2\frac{3}{4}$
$1\frac{3}{8}$	4.50	12	$8\frac{1}{2}$	1	$2\frac{3}{4}$

**No. 120 F-B.**  
**THREE-GROOVE CHUCKING REAMERS**  
 WITH STRAIGHT SHANKS.



FOR SCREW OR CHUCKING MACHINES.

Diameter, Inches.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.	Diameter of Shank, Inches.	Length of Shank, Inches.
1 $\frac{1}{8}$	\$4.65	12 $\frac{1}{8}$	8 $\frac{5}{8}$	1	2 $\frac{3}{4}$
1 $\frac{1}{4}$	4.65	12 $\frac{1}{8}$	8 $\frac{5}{8}$	1	2 $\frac{3}{4}$
1 $\frac{3}{8}$	4.80	12 $\frac{1}{2}$	8 $\frac{3}{4}$	1 $\frac{1}{4}$	3
1 $\frac{1}{2}$	4.80	12 $\frac{1}{2}$	8 $\frac{3}{4}$	1 $\frac{1}{4}$	3
1 $\frac{3}{4}$	5.00	14 $\frac{1}{8}$	10 $\frac{3}{8}$	1 $\frac{1}{4}$	3
1 $\frac{7}{8}$	5.00	14 $\frac{1}{8}$	10 $\frac{3}{8}$	1 $\frac{1}{4}$	3
1 $\frac{1}{2}$	5.20	14 $\frac{1}{4}$	10 $\frac{1}{2}$	1 $\frac{1}{4}$	3
1 $\frac{5}{8}$	5.20	14 $\frac{1}{4}$	10 $\frac{1}{2}$	1 $\frac{1}{4}$	3
1 $\frac{3}{4}$	5.35	14 $\frac{3}{8}$	10 $\frac{5}{8}$	1 $\frac{1}{4}$	3
1 $\frac{7}{8}$	5.35	14 $\frac{3}{8}$	10 $\frac{5}{8}$	1 $\frac{1}{4}$	3
1 $\frac{1}{2}$	5.60	14 $\frac{1}{2}$	10 $\frac{3}{4}$	1 $\frac{1}{4}$	3
1 $\frac{3}{8}$	5.60	14 $\frac{1}{2}$	10 $\frac{3}{4}$	1 $\frac{1}{4}$	3
1 $\frac{1}{4}$	5.80	14 $\frac{5}{8}$	10 $\frac{7}{8}$	1 $\frac{1}{4}$	3
1 $\frac{1}{8}$	5.80	14 $\frac{5}{8}$	10 $\frac{7}{8}$	1 $\frac{1}{4}$	3
1 $\frac{1}{8}$	6.00	14 $\frac{3}{4}$	11	1 $\frac{1}{4}$	3
1 $\frac{1}{8}$	6.00	14 $\frac{3}{4}$	11	1 $\frac{1}{4}$	3
1 $\frac{1}{8}$	6.20	14 $\frac{7}{8}$	11 $\frac{1}{8}$	1 $\frac{1}{4}$	3
1 $\frac{1}{8}$	6.20	14 $\frac{7}{8}$	11 $\frac{1}{8}$	1 $\frac{1}{4}$	3
1 $\frac{1}{8}$	6.40	15	11 $\frac{1}{4}$	1 $\frac{1}{4}$	3
1 $\frac{1}{2}$	6.40	15	11 $\frac{1}{4}$	1 $\frac{1}{4}$	3
1 $\frac{1}{2}$	6.65	15	11 $\frac{1}{4}$	1 $\frac{1}{4}$	3
1 $\frac{1}{8}$	6.90	15 $\frac{1}{4}$	11 $\frac{1}{2}$	1 $\frac{1}{4}$	3
1 $\frac{1}{8}$	7.15	15 $\frac{1}{4}$	11 $\frac{1}{2}$	1 $\frac{1}{4}$	3
1 $\frac{1}{8}$	7.40	15 $\frac{1}{2}$	11 $\frac{3}{4}$	1 $\frac{1}{4}$	3
1 $\frac{1}{8}$	7.65	15 $\frac{1}{2}$	11 $\frac{3}{4}$	1 $\frac{1}{4}$	3
1 $\frac{1}{8}$	7.90	15 $\frac{3}{4}$	12	1 $\frac{1}{4}$	3
1 $\frac{1}{8}$	8.15	15 $\frac{3}{4}$	12	1 $\frac{1}{4}$	3
1 $\frac{3}{4}$	8.40	16	11 $\frac{7}{8}$	1 $\frac{1}{4}$	3
1 $\frac{1}{8}$	8.60	16	11 $\frac{7}{8}$	1 $\frac{1}{4}$	3
1 $\frac{1}{8}$	8.80	16 $\frac{1}{4}$	12 $\frac{1}{8}$	1 $\frac{1}{4}$	3
1 $\frac{1}{8}$	9.00	16 $\frac{1}{4}$	12 $\frac{1}{8}$	1 $\frac{1}{4}$	3
1 $\frac{7}{8}$	9.20	16 $\frac{1}{2}$	12 $\frac{1}{4}$	1 $\frac{1}{4}$	3
1 $\frac{1}{8}$	9.35	16 $\frac{1}{2}$	12 $\frac{1}{4}$	1 $\frac{1}{4}$	3
1 $\frac{1}{8}$	9.50	16 $\frac{1}{2}$	12 $\frac{1}{4}$	1 $\frac{1}{4}$	3

64th sizes not listed furnished at price of next larger size.

**No. 120 F-B.**  
**THREE-GROOVE CHUCKING REAMERS**  
**WITH STRAIGHT SHANKS.**



FOR SCREW OR CHUCKING MACHINES.

Diameter, Inches.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.	Diameter of Shank, Inches.	Length of Shank, Inches.
1 $\frac{3}{4}$	\$9.65	16 $\frac{1}{2}$	12 $\frac{1}{4}$	1 $\frac{1}{4}$	3
2	9.80	16 $\frac{1}{2}$	12 $\frac{1}{8}$	1 $\frac{1}{4}$	3
2 $\frac{1}{8}$	10.20	16 $\frac{1}{2}$	11 $\frac{3}{4}$	1 $\frac{1}{2}$	3 $\frac{1}{2}$
2 $\frac{1}{16}$	10.60	17	12 $\frac{1}{4}$	1 $\frac{1}{2}$	3 $\frac{1}{2}$
2 $\frac{3}{32}$	10.90	17	12 $\frac{1}{4}$	1 $\frac{1}{2}$	3 $\frac{1}{2}$
2 $\frac{1}{8}$	11.20	17	12 $\frac{1}{8}$	1 $\frac{1}{2}$	3 $\frac{1}{2}$
2 $\frac{3}{32}$	11.60	17	12 $\frac{1}{8}$	1 $\frac{1}{2}$	3 $\frac{1}{2}$
2 $\frac{3}{16}$	12.00	17	12 $\frac{1}{8}$	1 $\frac{1}{2}$	3 $\frac{1}{2}$
2 $\frac{7}{32}$	12.40	17 $\frac{1}{2}$	12 $\frac{5}{8}$	1 $\frac{1}{2}$	3 $\frac{1}{2}$
2 $\frac{1}{4}$	12.80	17 $\frac{1}{2}$	12 $\frac{1}{2}$	1 $\frac{1}{2}$	3 $\frac{1}{2}$
2 $\frac{9}{32}$	13.20	17 $\frac{1}{2}$	12 $\frac{1}{2}$	1 $\frac{1}{2}$	3 $\frac{1}{2}$
2 $\frac{5}{16}$	13.60	17 $\frac{1}{2}$	12 $\frac{1}{2}$	1 $\frac{1}{2}$	3 $\frac{1}{2}$
2 $\frac{11}{32}$	14.00	18	13	1 $\frac{1}{2}$	3 $\frac{1}{2}$
2 $\frac{3}{8}$	14.40	18	12 $\frac{7}{8}$	1 $\frac{1}{2}$	3 $\frac{1}{2}$
2 $\frac{13}{32}$	14.70	18 $\frac{1}{2}$	13 $\frac{3}{8}$	1 $\frac{1}{2}$	3 $\frac{1}{2}$
2 $\frac{7}{16}$	15.00	18 $\frac{1}{2}$	13 $\frac{3}{8}$	1 $\frac{1}{2}$	3 $\frac{1}{2}$
2 $\frac{15}{32}$	15.30	19	13 $\frac{7}{8}$	1 $\frac{1}{2}$	3 $\frac{1}{2}$
2 $\frac{1}{2}$	15.60	19	13 $\frac{3}{4}$	1 $\frac{1}{2}$	3 $\frac{1}{2}$
2 $\frac{17}{32}$	15.90	19 $\frac{1}{4}$	14	1 $\frac{1}{2}$	3 $\frac{1}{2}$
2 $\frac{9}{16}$	16.20	19 $\frac{1}{4}$	14	1 $\frac{1}{2}$	3 $\frac{1}{2}$
2 $\frac{19}{32}$	16.50	19 $\frac{1}{2}$	14 $\frac{1}{4}$	1 $\frac{1}{2}$	3 $\frac{1}{2}$
2 $\frac{5}{8}$	16.80	19 $\frac{1}{2}$	14 $\frac{1}{8}$	1 $\frac{1}{2}$	3 $\frac{1}{2}$
2 $\frac{31}{32}$	17.35	20	14 $\frac{5}{8}$	1 $\frac{1}{2}$	3 $\frac{1}{2}$
2 $\frac{1}{8}$	17.90	20	14 $\frac{5}{8}$	1 $\frac{1}{2}$	3 $\frac{1}{2}$
2 $\frac{33}{32}$	18.45	20 $\frac{1}{2}$	15 $\frac{1}{8}$	1 $\frac{1}{2}$	3 $\frac{1}{2}$
2 $\frac{3}{4}$	19.00	20 $\frac{1}{2}$	15	1 $\frac{1}{2}$	3 $\frac{1}{2}$
2 $\frac{35}{32}$	19.50	20 $\frac{1}{2}$	14 $\frac{1}{2}$	1 $\frac{3}{4}$	4
2 $\frac{11}{16}$	20.00	20 $\frac{1}{2}$	14 $\frac{1}{2}$	1 $\frac{3}{4}$	4
2 $\frac{37}{32}$	20.50	21	15	1 $\frac{3}{4}$	4
2 $\frac{7}{8}$	21.00	21	14 $\frac{7}{8}$	1 $\frac{3}{4}$	4
2 $\frac{39}{32}$	22.00	21	14 $\frac{7}{8}$	1 $\frac{3}{4}$	4
2 $\frac{15}{16}$	23.00	21	14 $\frac{7}{8}$	1 $\frac{3}{4}$	4
2 $\frac{41}{32}$	24.00	22	15 $\frac{7}{8}$	1 $\frac{3}{4}$	4
3	25.00	22	15 $\frac{3}{4}$	1 $\frac{3}{4}$	4

64th sizes not listed furnished at price of next larger size.

**No. 120 F-C.****THREE-GROOVE CHUCKING REAMERS**

WITH HOLES THROUGH SOLID METAL FOR LUBRICANT

AND MORSE TAPER SHANKS.



These Reamers are specially adapted for enlarging cored holes and have shank and fluted portion ground on centers to size. Special lengths made to order at special sizes.

Diameter, Inches.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.	Morse Taper Shank.
$\frac{3}{8}$	\$2.75	$6\frac{3}{4}$	$3\frac{7}{8}$	No. 1.
$\frac{25}{64}$	2.75	7	$3\frac{11}{16}$	
$\frac{13}{32}$	2.75	7	$3\frac{11}{16}$	
$\frac{27}{64}$	2.75	$7\frac{1}{4}$	$3\frac{11}{16}$	
$\frac{7}{16}$	2.85	$7\frac{1}{4}$	$3\frac{11}{16}$	
$\frac{29}{64}$	2.85	$7\frac{1}{2}$	$4\frac{3}{16}$	
$\frac{15}{32}$	2.85	$7\frac{1}{2}$	$4\frac{3}{16}$	
$\frac{31}{64}$	2.85	$7\frac{3}{4}$	$4\frac{7}{16}$	
$\frac{1}{2}$	2.85	$7\frac{3}{4}$	$4\frac{7}{16}$	
$\frac{33}{64}$	2.95	8	$4\frac{11}{16}$	
$\frac{17}{32}$	2.95	8	$4\frac{11}{16}$	
$\frac{35}{64}$	3.00	$8\frac{1}{4}$	$4\frac{11}{16}$	
$\frac{9}{16}$	3.00	$8\frac{1}{4}$	$4\frac{11}{16}$	
$\frac{37}{64}$	3.45	$8\frac{1}{2}$	$4\frac{5}{8}$	
$\frac{19}{32}$	3.45	$8\frac{1}{2}$	$4\frac{5}{8}$	
$\frac{39}{64}$	3.90	$8\frac{3}{4}$	$4\frac{7}{8}$	No. 2.
$\frac{5}{8}$	3.90	$8\frac{3}{4}$	$4\frac{7}{8}$	
$\frac{41}{64}$	4.00	9	$5\frac{1}{8}$	
$\frac{21}{32}$	4.00	9	$5\frac{1}{8}$	
$\frac{43}{64}$	4.15	$9\frac{1}{4}$	$5\frac{3}{8}$	
$\frac{11}{16}$	4.15	$9\frac{1}{4}$	$5\frac{3}{8}$	
$\frac{45}{64}$	4.25	$9\frac{1}{2}$	$5\frac{5}{8}$	
$\frac{23}{32}$	4.25	$9\frac{1}{2}$	$5\frac{5}{8}$	
$\frac{47}{64}$	4.35	$9\frac{3}{4}$	$5\frac{7}{8}$	
$\frac{3}{4}$	4.35	$9\frac{3}{4}$	$5\frac{7}{8}$	
$\frac{49}{64}$	4.50	$9\frac{7}{8}$	6	
$\frac{25}{32}$	4.50	$9\frac{7}{8}$	6	
$\frac{51}{64}$	4.60	10	$6\frac{1}{8}$	



**No. 120 F-C.**

**THREE-GROOVE CHUCKING REAMERS**  
**WITH HOLES THROUGH SOLID METAL FOR LUBRICANT**  
**AND MORSE TAPER SHANKS.**



Diameter, Inches.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.	Morse Taper Shank.
$\frac{1}{16}$	\$4.60	10	$6\frac{1}{8}$	No. 2.
$\frac{5}{32}$	4.70	$10\frac{1}{4}$	$6\frac{3}{8}$	
$\frac{3}{16}$	4.70	$10\frac{1}{4}$	$6\frac{3}{8}$	
$\frac{7}{32}$	4.80	$10\frac{1}{2}$	$6\frac{5}{8}$	
$\frac{1}{8}$	4.80	$10\frac{1}{2}$	$6\frac{5}{8}$	
$\frac{9}{32}$	4.95	$10\frac{5}{8}$	$6\frac{3}{4}$	
$\frac{5}{16}$	4.95	$10\frac{5}{8}$	$6\frac{3}{4}$	
$\frac{3}{8}$	5.10	$10\frac{3}{4}$	$6\frac{1}{8}$	
$\frac{7}{16}$	5.10	$10\frac{3}{4}$	$6\frac{1}{8}$	
$\frac{1}{2}$	5.25	$10\frac{7}{8}$	$6\frac{1}{4}$	
$\frac{9}{16}$	5.25	$10\frac{7}{8}$	$6\frac{1}{4}$	No. 3.
$\frac{5}{8}$	5.40	11	$6\frac{3}{8}$	
1	5.40	11	$6\frac{3}{8}$	
$1\frac{1}{16}$	5.55	$11\frac{1}{8}$	$6\frac{1}{2}$	
$1\frac{1}{8}$	5.55	$11\frac{1}{8}$	$6\frac{1}{2}$	
$1\frac{3}{16}$	5.70	$11\frac{1}{4}$	$6\frac{5}{8}$	
$1\frac{1}{4}$	5.70	$11\frac{1}{4}$	$6\frac{5}{8}$	
$1\frac{5}{8}$	5.85	$11\frac{1}{2}$	$6\frac{7}{8}$	
$1\frac{3}{2}$	5.85	$11\frac{1}{2}$	$6\frac{7}{8}$	
$1\frac{7}{8}$	6.00	$11\frac{3}{4}$	$7\frac{1}{8}$	
$1\frac{1}{2}$	6.00	$11\frac{3}{4}$	$7\frac{1}{8}$	
$1\frac{9}{8}$	6.40	$11\frac{7}{8}$	$7\frac{1}{4}$	
$1\frac{5}{2}$	6.40	$11\frac{7}{8}$	$7\frac{1}{4}$	
$1\frac{11}{8}$	6.75	12	$7\frac{3}{8}$	
$1\frac{3}{4}$	6.75	12	$7\frac{3}{8}$	
$1\frac{13}{8}$	6.95	$12\frac{1}{8}$	$7\frac{1}{2}$	
$1\frac{7}{4}$	6.95	$12\frac{1}{8}$	$7\frac{1}{2}$	
$1\frac{15}{8}$	7.20	$12\frac{1}{2}$	$7\frac{7}{8}$	
$1\frac{1}{2}$	7.20	$12\frac{1}{2}$	$7\frac{7}{8}$	

## No. 120 F-C.

**THREE-GROOVE CHUCKING REAMERS**  
**WITH HOLES THROUGH SOLID METAL FOR LUBRICANT**  
**AND MORSE TAPER SHANKS.**



Diameter, Inches.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.	Morse Taper Shank.
$1\frac{1}{64}$	\$7.40	$14\frac{1}{8}$	$8\frac{1}{2}$	No. 4.
$1\frac{1}{32}$	7.40	$14\frac{1}{8}$	$8\frac{1}{2}$	
$1\frac{1}{16}$	7.80	$14\frac{1}{4}$	$8\frac{5}{8}$	
$1\frac{1}{8}$	7.80	$14\frac{1}{4}$	$8\frac{5}{8}$	
$1\frac{1}{4}$	8.10	$14\frac{3}{8}$	$8\frac{3}{4}$	
$1\frac{1}{2}$	8.10	$14\frac{3}{8}$	$8\frac{3}{4}$	
$1\frac{3}{4}$	8.40	$14\frac{1}{2}$	$8\frac{7}{8}$	
$1\frac{7}{8}$	8.40	$14\frac{1}{2}$	$8\frac{7}{8}$	
$1\frac{25}{64}$	8.70	$14\frac{5}{8}$	9	
$1\frac{1}{2}$	8.70	$14\frac{5}{8}$	9	
$1\frac{27}{64}$	9.00	$14\frac{3}{4}$	$9\frac{1}{8}$	
$1\frac{7}{16}$	9.00	$14\frac{3}{4}$	$9\frac{1}{8}$	
$1\frac{29}{64}$	9.30	$14\frac{7}{8}$	$9\frac{1}{4}$	
$1\frac{15}{32}$	9.30	$14\frac{7}{8}$	$9\frac{1}{4}$	
$1\frac{31}{64}$	9.60	15	$9\frac{3}{8}$	
$1\frac{1}{2}$	9.60	15	$9\frac{3}{8}$	
$1\frac{17}{32}$	10.00	15	$9\frac{3}{8}$	
$1\frac{9}{16}$	10.35	$15\frac{1}{4}$	$9\frac{5}{8}$	
$1\frac{19}{32}$	10.75	$15\frac{1}{4}$	$9\frac{5}{8}$	
$1\frac{5}{8}$	11.10	$15\frac{1}{2}$	$9\frac{7}{8}$	
$1\frac{21}{32}$	11.50	$15\frac{1}{2}$	$9\frac{7}{8}$	
$1\frac{11}{16}$	11.85	$15\frac{3}{4}$	$10\frac{1}{8}$	
$1\frac{23}{32}$	12.25	$15\frac{3}{4}$	$9\frac{11}{16}$	
$1\frac{3}{4}$	12.60	16	$9\frac{15}{16}$	
$1\frac{25}{32}$	12.90	16	$9\frac{15}{16}$	
$1\frac{13}{16}$	13.20	$16\frac{1}{4}$	$10\frac{1}{8}$	
$1\frac{27}{32}$	13.50	$16\frac{1}{4}$	$10\frac{1}{8}$	
$1\frac{7}{8}$	13.80	$16\frac{1}{2}$	$10\frac{3}{8}$	
$1\frac{29}{32}$	14.05	$16\frac{1}{2}$	$10\frac{3}{8}$	
$1\frac{15}{8}$	14.25	$16\frac{1}{2}$	$10\frac{1}{4}$	
$1\frac{31}{32}$	14.50	$16\frac{1}{2}$	$10\frac{1}{4}$	
2	14.70	$16\frac{1}{2}$	$10\frac{1}{4}$	

64th sizes not listed furnished at price of next larger size.

## No. 120 F-C.

## THREE-GROOVE CHUCKING REAMERS

WITH HOLES THROUGH SOLID METAL FOR LUBRICANT  
AND MORSE TAPER SHANKS.



Diameter, Inches.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.	Morse Taper Shank.
2 $\frac{1}{32}$	\$14.80	16 $\frac{1}{2}$	9 $\frac{1}{2}$	No. 5.
2 $\frac{1}{16}$	14.85	17	10	
2 $\frac{3}{32}$	15.30	17	10	
2 $\frac{1}{8}$	15.70	17	10	
2 $\frac{5}{32}$	16.25	17	10	
2 $\frac{3}{16}$	16.80	17	10	
2 $\frac{7}{32}$	17.40	17 $\frac{1}{2}$	10 $\frac{1}{2}$	
2 $\frac{1}{4}$	17.95	17 $\frac{1}{2}$	10 $\frac{1}{8}$	
2 $\frac{9}{32}$	18.50	17 $\frac{1}{2}$	10 $\frac{1}{8}$	
2 $\frac{5}{16}$	19.00	17 $\frac{1}{2}$	10 $\frac{1}{8}$	
2 $\frac{11}{32}$	19.60	18	10 $\frac{5}{8}$	
2 $\frac{3}{8}$	20.15	18	10 $\frac{1}{2}$	
2 $\frac{13}{32}$	20.60	18 $\frac{1}{2}$	11	
2 $\frac{7}{16}$	21.00	18 $\frac{1}{2}$	11	
2 $\frac{15}{32}$	21.45	19	11 $\frac{1}{2}$	
2 $\frac{1}{2}$	21.85	19	11 $\frac{3}{8}$	
2 $\frac{17}{32}$	22.30	19 $\frac{1}{4}$	11 $\frac{5}{8}$	
2 $\frac{9}{16}$	22.70	19 $\frac{1}{4}$	11 $\frac{5}{8}$	
2 $\frac{19}{32}$	23.10	19 $\frac{1}{2}$	11 $\frac{7}{8}$	
2 $\frac{5}{8}$	23.50	19 $\frac{1}{2}$	11 $\frac{3}{4}$	
2 $\frac{21}{32}$	24.25	20	12 $\frac{1}{4}$	
2 $\frac{11}{16}$	25.00	20	12 $\frac{1}{4}$	
2 $\frac{23}{32}$	25.80	20 $\frac{1}{2}$	12 $\frac{3}{4}$	
2 $\frac{3}{4}$	26.60	20 $\frac{1}{2}$	12 $\frac{5}{8}$	
2 $\frac{25}{32}$	27.30	20 $\frac{1}{2}$	12 $\frac{5}{8}$	
2 $\frac{13}{16}$	28.00	20 $\frac{1}{2}$	12 $\frac{5}{8}$	
2 $\frac{27}{32}$	28.70	21	13 $\frac{1}{8}$	
2 $\frac{7}{8}$	29.40	21	13	
2 $\frac{29}{32}$	30.80	21	13	
2 $\frac{15}{16}$	32.20	21	13	
2 $\frac{31}{32}$	33.60	22	14	
3	35.00	22	13 $\frac{7}{8}$	

64th sizes not listed furnished at price of next larger size.

**No. 120 F-E.****THREE-GROOVE CHUCKING REAMERS**

WITH HOLES THROUGH SOLID METAL FOR LUBRICANT  
AND STRAIGHT SHANKS.



These Reamers are specially adapted for enlarging cored holes and have shank and fluted portion ground on centers to size. Special lengths made to order at special prices.

Diameter, Inches.	Price Each.	Whole Length Inches.	Twist Cut, Inches.	Diameter of Shank, Inches.	Length of Shank, Inches.
$\frac{3}{8}$	\$2.75	$6\frac{3}{4}$	$4\frac{1}{4}$	$\frac{3}{8}$	$1\frac{3}{4}$
$\frac{7}{16}$	2.75	7	$4\frac{1}{2}$	$\frac{3}{8}$	$1\frac{3}{4}$
$\frac{1}{2}$	2.75	7	$4\frac{1}{2}$	$\frac{3}{8}$	$1\frac{3}{4}$
$\frac{9}{16}$	2.75	$7\frac{1}{4}$	$4\frac{3}{4}$	$\frac{3}{8}$	$1\frac{3}{4}$
$\frac{5}{8}$	2.85	$7\frac{1}{4}$	$4\frac{3}{4}$	$\frac{3}{8}$	$1\frac{3}{4}$
$\frac{11}{16}$	2.85	$7\frac{1}{2}$	5	$\frac{3}{8}$	$1\frac{3}{4}$
$\frac{3}{4}$	2.85	$7\frac{1}{2}$	5	$\frac{3}{8}$	$1\frac{3}{4}$
$\frac{13}{16}$	2.85	$7\frac{3}{4}$	5	$\frac{1}{2}$	2
$\frac{7}{8}$	2.85	$7\frac{3}{4}$	5	$\frac{1}{2}$	2
$\frac{15}{16}$	2.95	8	$5\frac{1}{4}$	$\frac{1}{2}$	2
$\frac{1}{8}$	2.95	8	$5\frac{1}{4}$	$\frac{1}{2}$	2
$\frac{9}{16}$	3.00	$8\frac{1}{4}$	$5\frac{1}{2}$	$\frac{1}{2}$	2
$\frac{5}{8}$	3.00	$8\frac{1}{4}$	$5\frac{1}{2}$	$\frac{1}{2}$	2
$\frac{11}{16}$	3.45	$8\frac{1}{2}$	$5\frac{3}{4}$	$\frac{1}{2}$	2
$\frac{3}{4}$	3.45	$8\frac{1}{2}$	$5\frac{3}{4}$	$\frac{1}{2}$	2
$\frac{13}{16}$	3.90	$8\frac{3}{4}$	$5\frac{3}{4}$	$\frac{5}{8}$	$2\frac{1}{4}$
$\frac{7}{8}$	3.90	$8\frac{3}{4}$	$5\frac{3}{4}$	$\frac{5}{8}$	$2\frac{1}{4}$
$\frac{15}{16}$	4.00	9	6	$\frac{5}{8}$	$2\frac{1}{4}$
$\frac{1}{8}$	4.00	9	6	$\frac{5}{8}$	$2\frac{1}{4}$
$\frac{9}{16}$	4.15	$9\frac{1}{4}$	$6\frac{1}{4}$	$\frac{5}{8}$	$2\frac{1}{4}$
$\frac{5}{8}$	4.15	$9\frac{1}{4}$	$6\frac{1}{4}$	$\frac{5}{8}$	$2\frac{1}{4}$
$\frac{11}{16}$	4.25	$9\frac{1}{2}$	$6\frac{1}{2}$	$\frac{5}{8}$	$2\frac{1}{4}$
$\frac{3}{4}$	4.25	$9\frac{1}{2}$	$6\frac{1}{2}$	$\frac{5}{8}$	$2\frac{1}{4}$
$\frac{13}{16}$	4.35	$9\frac{3}{4}$	$6\frac{3}{4}$	$\frac{3}{4}$	$2\frac{1}{4}$
$\frac{7}{8}$	4.35	$9\frac{3}{4}$	$6\frac{3}{4}$	$\frac{3}{4}$	$2\frac{1}{4}$
$\frac{15}{16}$	4.50	$9\frac{7}{8}$	$6\frac{7}{8}$	$\frac{3}{4}$	$2\frac{1}{4}$
$\frac{1}{8}$	4.50	$9\frac{7}{8}$	$6\frac{7}{8}$	$\frac{3}{4}$	$2\frac{1}{4}$
$\frac{9}{16}$	4.60	10	7	$\frac{3}{4}$	$2\frac{1}{4}$

**No. 120 F-E.**  
**THREE-GROOVE CHUCKING REAMERS**  
 WITH HOLES THROUGH SOLID METAL FOR LUBRICANT  
 AND STRAIGHT SHANKS.



Diameter, Inches.	Price Each.	Whole Length, Inches.	Twist Cut Inches.	Diameter of Shank, Inches.	Length of Shank, Inches.
$\frac{13}{16}$	\$4.60	10	7	$\frac{3}{4}$	$2\frac{1}{4}$
$\frac{53}{64}$	4.70	$10\frac{1}{4}$	$7\frac{1}{4}$	$\frac{3}{4}$	$2\frac{1}{4}$
$\frac{37}{32}$	4.70	$10\frac{1}{4}$	$7\frac{1}{4}$	$\frac{3}{4}$	$2\frac{1}{4}$
$\frac{31}{32}$	4.80	$10\frac{1}{2}$	$7\frac{1}{4}$	$\frac{7}{8}$	$2\frac{1}{2}$
$\frac{7}{8}$	4.80	$10\frac{1}{2}$	$7\frac{1}{4}$	$\frac{7}{8}$	$2\frac{1}{2}$
$\frac{57}{64}$	4.95	$10\frac{5}{8}$	$7\frac{3}{8}$	$\frac{7}{8}$	$2\frac{1}{2}$
$\frac{33}{32}$	4.95	$10\frac{5}{8}$	$7\frac{3}{8}$	$\frac{7}{8}$	$2\frac{1}{2}$
$\frac{51}{64}$	5.10	$10\frac{3}{4}$	$7\frac{1}{2}$	$\frac{7}{8}$	$2\frac{1}{2}$
$\frac{15}{16}$	5.10	$10\frac{3}{4}$	$7\frac{1}{2}$	$\frac{7}{8}$	$2\frac{1}{2}$
$\frac{31}{32}$	5.25	$10\frac{7}{8}$	$7\frac{5}{8}$	$\frac{7}{8}$	$2\frac{1}{2}$
$\frac{31}{32}$	5.25	$10\frac{7}{8}$	$7\frac{5}{8}$	$\frac{7}{8}$	$2\frac{1}{2}$
$\frac{31}{32}$	5.40	11	$7\frac{1}{2}$	1	$2\frac{3}{4}$
1	5.40	11	$7\frac{1}{2}$	1	$2\frac{3}{4}$
$1\frac{1}{64}$	5.55	$11\frac{1}{8}$	$7\frac{5}{8}$	1	$2\frac{3}{4}$
$1\frac{1}{32}$	5.55	$11\frac{1}{8}$	$7\frac{5}{8}$	1	$2\frac{3}{4}$
$1\frac{3}{64}$	5.70	$11\frac{1}{4}$	$7\frac{3}{4}$	1	$2\frac{3}{4}$
$1\frac{1}{16}$	5.70	$11\frac{1}{4}$	$7\frac{3}{4}$	1	$2\frac{3}{4}$
$1\frac{5}{64}$	5.85	$11\frac{1}{2}$	8	1	$2\frac{3}{4}$
$1\frac{3}{32}$	5.85	$11\frac{1}{2}$	8	1	$2\frac{3}{4}$
$1\frac{7}{64}$	6.00	$11\frac{3}{4}$	$8\frac{1}{4}$	1	$2\frac{3}{4}$
$1\frac{1}{8}$	6.00	$11\frac{3}{4}$	$8\frac{1}{4}$	1	$2\frac{3}{4}$
$1\frac{9}{64}$	6.40	$11\frac{7}{8}$	$8\frac{3}{8}$	1	$2\frac{3}{4}$
$1\frac{3}{32}$	6.40	$11\frac{7}{8}$	$8\frac{3}{8}$	1	$2\frac{3}{4}$
$1\frac{11}{64}$	6.75	12	$8\frac{1}{2}$	1	$2\frac{3}{4}$
$1\frac{1}{16}$	6.75	12	$8\frac{1}{2}$	1	$2\frac{3}{4}$
$1\frac{13}{64}$	6.95	$12\frac{1}{8}$	$8\frac{5}{8}$	1	$2\frac{3}{4}$
$1\frac{7}{32}$	6.95	$12\frac{1}{8}$	$8\frac{5}{8}$	1	$2\frac{3}{4}$
$1\frac{15}{64}$	7.20	$12\frac{1}{2}$	$8\frac{3}{4}$	$1\frac{1}{4}$	3
$1\frac{1}{4}$	7.20	$12\frac{1}{2}$	$8\frac{3}{4}$	$1\frac{1}{4}$	3
$1\frac{17}{64}$	7.40	$14\frac{1}{8}$	$10\frac{3}{8}$	$1\frac{1}{4}$	3
$1\frac{9}{32}$	7.40	$14\frac{1}{8}$	$10\frac{3}{8}$	$1\frac{1}{4}$	3

**No. 120 F-E.**  
**THREE-GROOVE CHUCKING REAMERS**  
 WITH HOLES THROUGH SOLID METAL FOR LUBRICANT,  
 AND STRAIGHT SHANKS.



Diameter, Inches.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.	Diameter of Shank, Inches.	Length of Shank, Inches.
1 $\frac{1}{8}$	\$7.80	14 $\frac{1}{4}$	10 $\frac{1}{2}$	1 $\frac{1}{4}$	3
1 $\frac{5}{16}$	7.80	14 $\frac{1}{4}$	10 $\frac{1}{2}$	1 $\frac{1}{4}$	3
1 $\frac{3}{8}$	8.10	14 $\frac{3}{8}$	10 $\frac{5}{8}$	1 $\frac{1}{4}$	3
1 $\frac{7}{16}$	8.10	14 $\frac{3}{8}$	10 $\frac{5}{8}$	1 $\frac{1}{4}$	3
1 $\frac{1}{2}$	8.40	14 $\frac{1}{2}$	10 $\frac{3}{4}$	1 $\frac{1}{4}$	3
1 $\frac{3}{8}$	8.40	14 $\frac{1}{2}$	10 $\frac{3}{4}$	1 $\frac{1}{4}$	3
1 $\frac{7}{8}$	8.70	14 $\frac{5}{8}$	10 $\frac{7}{8}$	1 $\frac{1}{4}$	3
1 $\frac{15}{16}$	8.70	14 $\frac{5}{8}$	10 $\frac{7}{8}$	1 $\frac{1}{4}$	3
1 $\frac{1}{4}$	9.00	14 $\frac{3}{4}$	11	1 $\frac{1}{4}$	3
1 $\frac{5}{8}$	9.00	14 $\frac{3}{4}$	11	1 $\frac{1}{4}$	3
1 $\frac{3}{4}$	9.30	14 $\frac{7}{8}$	11 $\frac{1}{8}$	1 $\frac{1}{4}$	3
1 $\frac{7}{8}$	9.30	14 $\frac{7}{8}$	11 $\frac{1}{8}$	1 $\frac{1}{4}$	3
1 $\frac{15}{16}$	9.60	15	11 $\frac{1}{4}$	1 $\frac{1}{4}$	3
1 $\frac{1}{2}$	9.60	15	11 $\frac{1}{4}$	1 $\frac{1}{4}$	3
1 $\frac{3}{4}$	10.00	15	11 $\frac{1}{4}$	1 $\frac{1}{4}$	3
1 $\frac{5}{8}$	10.35	15 $\frac{1}{4}$	11 $\frac{1}{2}$	1 $\frac{1}{4}$	3
1 $\frac{3}{4}$	10.75	15 $\frac{1}{4}$	11 $\frac{1}{2}$	1 $\frac{1}{4}$	3
1 $\frac{7}{8}$	11.10	15 $\frac{1}{2}$	11 $\frac{3}{4}$	1 $\frac{1}{4}$	3
1 $\frac{15}{16}$	11.50	15 $\frac{1}{2}$	11 $\frac{3}{4}$	1 $\frac{1}{4}$	3
1 $\frac{1}{4}$	11.85	15 $\frac{3}{4}$	12	1 $\frac{1}{4}$	3
1 $\frac{3}{8}$	12.25	15 $\frac{3}{4}$	12	1 $\frac{1}{4}$	3
1 $\frac{1}{2}$	12.60	16	11 $\frac{7}{8}$	1 $\frac{1}{4}$	3
1 $\frac{3}{4}$	12.90	16	11 $\frac{7}{8}$	1 $\frac{1}{4}$	3
1 $\frac{7}{8}$	13.20	16 $\frac{1}{4}$	12 $\frac{1}{8}$	1 $\frac{1}{4}$	3
1 $\frac{15}{16}$	13.50	16 $\frac{1}{4}$	12 $\frac{1}{8}$	1 $\frac{1}{4}$	3
1 $\frac{1}{4}$	13.80	16 $\frac{1}{2}$	12 $\frac{1}{4}$	1 $\frac{1}{4}$	3
1 $\frac{3}{8}$	14.05	16 $\frac{1}{2}$	12 $\frac{1}{4}$	1 $\frac{1}{4}$	3
1 $\frac{1}{2}$	14.25	16 $\frac{1}{2}$	12 $\frac{1}{4}$	1 $\frac{1}{4}$	3
1 $\frac{3}{4}$	14.50	16 $\frac{1}{2}$	12 $\frac{1}{4}$	1 $\frac{1}{4}$	3
1 $\frac{7}{8}$	14.70	16 $\frac{1}{2}$	12 $\frac{1}{8}$	1 $\frac{1}{4}$	3
2	14.80	16 $\frac{1}{2}$	11 $\frac{3}{4}$	1 $\frac{1}{2}$	3 $\frac{1}{2}$

6th sizes not listed turned at price of next larger size.

**No. 120 F-E.**  
**THREE-GROOVE CHUCKING REAMERS**  
 WITH HOLES THROUGH SOLID METAL FOR LUBRICANT,  
 AND STRAIGHT SHANKS.



Diameter, Inches.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.	Diameter of Shank, Inches.	Length of Shank, Inches.
$2\frac{1}{16}$	\$14.85	17	$12\frac{1}{4}$	$1\frac{1}{2}$	$3\frac{1}{2}$
$2\frac{3}{32}$	15.30	17	$12\frac{1}{4}$	$1\frac{1}{2}$	$3\frac{1}{2}$
$2\frac{1}{8}$	15.70	17	$12\frac{1}{8}$	$1\frac{1}{2}$	$3\frac{1}{2}$
$2\frac{5}{32}$	16.25	17	$12\frac{1}{8}$	$1\frac{1}{2}$	$3\frac{1}{2}$
$2\frac{3}{16}$	16.80	17	$12\frac{1}{8}$	$1\frac{1}{2}$	$3\frac{1}{2}$
$2\frac{7}{32}$	17.40	$17\frac{1}{2}$	$12\frac{5}{8}$	$1\frac{1}{2}$	$3\frac{1}{2}$
$2\frac{1}{4}$	17.95	$17\frac{1}{2}$	$12\frac{1}{2}$	$1\frac{1}{2}$	$3\frac{1}{2}$
$2\frac{9}{32}$	18.50	$17\frac{1}{2}$	$12\frac{1}{2}$	$1\frac{1}{2}$	$3\frac{1}{2}$
$2\frac{5}{16}$	19.00	$17\frac{1}{2}$	$12\frac{1}{2}$	$1\frac{1}{2}$	$3\frac{1}{2}$
$2\frac{11}{32}$	19.60	18	13	$1\frac{1}{2}$	$3\frac{1}{2}$
$2\frac{3}{8}$	20.15	18	$12\frac{7}{8}$	$1\frac{1}{2}$	$3\frac{1}{2}$
$2\frac{13}{32}$	20.60	$18\frac{1}{2}$	$13\frac{3}{8}$	$1\frac{1}{2}$	$3\frac{1}{2}$
$2\frac{7}{16}$	21.00	$18\frac{1}{2}$	$13\frac{3}{8}$	$1\frac{1}{2}$	$3\frac{1}{2}$
$2\frac{15}{32}$	21.45	19	$13\frac{7}{8}$	$1\frac{1}{2}$	$3\frac{1}{2}$
$2\frac{1}{2}$	21.85	19	$13\frac{3}{4}$	$1\frac{1}{2}$	$3\frac{1}{2}$
$2\frac{17}{32}$	22.30	$19\frac{1}{4}$	14	$1\frac{1}{2}$	$3\frac{1}{2}$
$2\frac{9}{16}$	22.70	$19\frac{1}{4}$	14	$1\frac{1}{2}$	$3\frac{1}{2}$
$2\frac{19}{32}$	23.10	$19\frac{1}{2}$	$14\frac{1}{4}$	$1\frac{1}{2}$	$3\frac{1}{2}$
$2\frac{5}{8}$	23.50	$19\frac{1}{2}$	$14\frac{1}{8}$	$1\frac{1}{2}$	$3\frac{1}{2}$
$2\frac{21}{32}$	24.25	20	$14\frac{5}{8}$	$1\frac{1}{2}$	$3\frac{1}{2}$
$2\frac{11}{16}$	25.00	20	$14\frac{5}{8}$	$1\frac{1}{2}$	$3\frac{1}{2}$
$2\frac{23}{32}$	25.80	$20\frac{1}{2}$	$15\frac{1}{8}$	$1\frac{1}{2}$	$3\frac{1}{2}$
$2\frac{3}{4}$	26.60	$20\frac{1}{2}$	15	$1\frac{1}{2}$	$3\frac{1}{2}$
$2\frac{25}{32}$	27.30	$20\frac{1}{2}$	$14\frac{1}{2}$	$1\frac{3}{4}$	4
$2\frac{13}{16}$	28.00	$20\frac{1}{2}$	$14\frac{1}{2}$	$1\frac{3}{4}$	4
$2\frac{27}{32}$	28.70	21	15	$1\frac{3}{4}$	4
$2\frac{7}{8}$	29.40	21	$14\frac{7}{8}$	$1\frac{3}{4}$	4
$2\frac{29}{32}$	30.80	21	$14\frac{7}{8}$	$1\frac{3}{4}$	4
$2\frac{15}{16}$	32.20	21	$14\frac{7}{8}$	$1\frac{3}{4}$	4
$2\frac{31}{32}$	33.60	22	$15\frac{7}{8}$	$1\frac{3}{4}$	4
3	35.00	22	$15\frac{3}{4}$	$1\frac{3}{4}$	4

64th sizes not listed furnished at price of next larger size.

**No. 120 F-F.**  
**THREE-GROOVE CHUCKING REAMERS**  
 WITH HOLES THROUGH SOLID METAL FOR LUBRICANT,  
 AND MORSE TAPER SHANKS.



These Reamers are specially adapted for enlarging cored holes and have shank and fluted portion ground on centers to size. Special lengths made to order at special prices.

These Reamers can be made to be used in the same manner as oil drills illustrated on pages 115 to 143 inclusive.

Reamers as shown above are to be used for passing completely through the work.

Diameter, Inches.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.	Morse Taper Shank.
$\frac{3}{8}$	\$2.75	$6\frac{3}{4}$	$3\frac{7}{8}$	No. 1.
$\frac{25}{64}$	2.75	7	$3\frac{11}{16}$	
$\frac{13}{32}$	2.75	7	$3\frac{11}{16}$	
$\frac{27}{64}$	2.75	$7\frac{1}{4}$	$3\frac{15}{16}$	
$\frac{7}{16}$	2.85	$7\frac{1}{4}$	$3\frac{15}{16}$	
$\frac{29}{64}$	2.85	$7\frac{1}{2}$	$4\frac{1}{8}$	
$\frac{15}{32}$	2.85	$7\frac{1}{2}$	$4\frac{1}{8}$	
$\frac{31}{64}$	2.85	$7\frac{3}{4}$	$4\frac{7}{8}$	
$\frac{1}{2}$	2.85	$7\frac{3}{4}$	$4\frac{7}{8}$	
$\frac{33}{64}$	2.95	8	$4\frac{11}{16}$	
$\frac{17}{32}$	2.95	8	$4\frac{11}{16}$	
$\frac{35}{64}$	3.00	$8\frac{1}{4}$	$4\frac{11}{16}$	
$\frac{9}{16}$	3.00	$8\frac{1}{4}$	$4\frac{11}{16}$	
$\frac{37}{64}$	3.45	$8\frac{1}{2}$	$4\frac{5}{8}$	
$\frac{19}{32}$	3.45	$8\frac{1}{2}$	$4\frac{5}{8}$	
$\frac{39}{64}$	3.90	$8\frac{3}{4}$	$4\frac{7}{8}$	No. 2.
$\frac{5}{8}$	3.90	$8\frac{3}{4}$	$4\frac{7}{8}$	
$\frac{41}{64}$	4.00	9	$5\frac{1}{8}$	
$\frac{43}{64}$	4.00	9	$5\frac{1}{8}$	
$\frac{11}{16}$	4.15	$9\frac{1}{4}$	$5\frac{3}{8}$	
$\frac{45}{64}$	4.15	$9\frac{1}{4}$	$5\frac{3}{8}$	
$\frac{47}{64}$	4.25	$9\frac{1}{2}$	$5\frac{5}{8}$	
$\frac{23}{32}$	4.25	$9\frac{1}{2}$	$5\frac{5}{8}$	
$\frac{49}{64}$	4.35	$9\frac{3}{4}$	$5\frac{7}{8}$	
$\frac{3}{4}$	4.35	$9\frac{3}{4}$	$5\frac{7}{8}$	
$\frac{51}{64}$	4.50	$9\frac{7}{8}$	6	



**No. 120 F-F.**  
**THREE-GROOVE CHUCKING REAMERS**  
 WITH HOLES THROUGH SOLID METAL FOR LUBRICANT,  
 AND MORSE TAPER SHANKS.



Diameter, Inches.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.	Morse Taper Shank.
$\frac{3}{32}$	\$4.50	$9\frac{7}{8}$	6	No. 2.
$\frac{1}{8}$	4.60	10	$6\frac{1}{8}$	
$\frac{1}{4}$	4.60	10	$6\frac{1}{8}$	
$\frac{5}{16}$	4.70	$10\frac{1}{4}$	$6\frac{3}{8}$	
$\frac{3}{8}$	4.70	$10\frac{1}{4}$	$6\frac{3}{8}$	
$\frac{7}{16}$	4.80	$10\frac{1}{2}$	$6\frac{5}{8}$	
$\frac{1}{2}$	4.80	$10\frac{1}{2}$	$6\frac{5}{8}$	
$\frac{9}{16}$	4.95	$10\frac{5}{8}$	$6\frac{3}{4}$	
$\frac{5}{8}$	4.95	$10\frac{5}{8}$	$6\frac{3}{4}$	
$\frac{11}{16}$	5.10	$10\frac{3}{4}$	$6\frac{1}{2}$	
$\frac{3}{4}$	5.10	$10\frac{3}{4}$	$6\frac{1}{2}$	
$\frac{13}{16}$	5.25	$10\frac{7}{8}$	$6\frac{1}{4}$	
$\frac{7}{8}$	5.25	$10\frac{7}{8}$	$6\frac{1}{4}$	
$\frac{15}{16}$	5.40	11	$6\frac{3}{8}$	
1	5.40	11	$6\frac{3}{8}$	No. 3.
$1\frac{1}{16}$	5.55	$11\frac{1}{8}$	$6\frac{1}{2}$	
$1\frac{1}{8}$	5.55	$11\frac{1}{8}$	$6\frac{1}{2}$	
$1\frac{3}{8}$	5.70	$11\frac{1}{4}$	$6\frac{5}{8}$	
$1\frac{1}{2}$	5.70	$11\frac{1}{4}$	$6\frac{5}{8}$	
$1\frac{5}{8}$	5.85	$11\frac{1}{2}$	$6\frac{7}{8}$	
$1\frac{3}{4}$	5.85	$11\frac{1}{2}$	$6\frac{7}{8}$	
$1\frac{7}{8}$	6.00	$11\frac{3}{4}$	$7\frac{1}{8}$	
$2\frac{1}{8}$	6.00	$11\frac{3}{4}$	$7\frac{1}{8}$	
$2\frac{1}{4}$	6.40	$11\frac{7}{8}$	$7\frac{1}{4}$	
$2\frac{1}{2}$	6.40	$11\frac{7}{8}$	$7\frac{1}{4}$	
$2\frac{3}{4}$	6.75	12	$7\frac{3}{8}$	
$2\frac{7}{8}$	6.75	12	$7\frac{3}{8}$	
$3\frac{1}{8}$	6.95	$12\frac{1}{8}$	$7\frac{1}{2}$	
$3\frac{1}{4}$	6.95	$12\frac{1}{8}$	$7\frac{1}{2}$	
$3\frac{3}{4}$	7.20	$12\frac{1}{2}$	$7\frac{3}{8}$	
$4\frac{1}{4}$	7.20	$12\frac{1}{2}$	$7\frac{3}{8}$	

**No. 120 F-F.**  
**THREE-GROOVE CHUCKING REAMERS**  
 WITH HOLES THROUGH SOLID METAL FOR LUBRICANT,  
 AND MORSE TAPER SHANKS.



Diameter, Inches.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.	Morse Taper Shank.
$1\frac{1}{64}$	\$7.40	$14\frac{1}{8}$	$8\frac{1}{2}$	No. 4.
$1\frac{3}{32}$	7.40	$14\frac{1}{8}$	$8\frac{1}{2}$	
$1\frac{1}{16}$	7.80	$14\frac{1}{4}$	$8\frac{5}{8}$	
$1\frac{5}{16}$	7.80	$14\frac{1}{4}$	$8\frac{5}{8}$	
$1\frac{3}{8}$	8.10	$14\frac{3}{8}$	$8\frac{3}{4}$	
$1\frac{11}{16}$	8.10	$14\frac{3}{8}$	$8\frac{3}{4}$	
$1\frac{1}{2}$	8.40	$14\frac{1}{2}$	$8\frac{7}{8}$	
$1\frac{5}{8}$	8.40	$14\frac{1}{2}$	$8\frac{7}{8}$	
$1\frac{3}{4}$	8.70	$14\frac{5}{8}$	9	
$1\frac{7}{8}$	8.70	$14\frac{5}{8}$	9	
$1\frac{1}{2}$	9.00	$14\frac{3}{4}$	$9\frac{1}{8}$	
$1\frac{7}{16}$	9.00	$14\frac{3}{4}$	$9\frac{1}{8}$	
$1\frac{29}{64}$	9.30	$14\frac{7}{8}$	$9\frac{1}{4}$	
$1\frac{1}{2}$	9.30	$14\frac{7}{8}$	$9\frac{1}{4}$	
$1\frac{3}{4}$	9.60	15	$9\frac{3}{8}$	
$1\frac{1}{2}$	9.60	15	$9\frac{3}{8}$	
$1\frac{1}{2}$	10.00	15	$9\frac{3}{8}$	
$1\frac{9}{16}$	10.35	$15\frac{1}{4}$	$9\frac{5}{8}$	
$1\frac{1}{2}$	10.75	$15\frac{1}{4}$	$9\frac{5}{8}$	
$1\frac{5}{8}$	11.10	$15\frac{1}{2}$	$9\frac{7}{8}$	
$1\frac{1}{2}$	11.50	$15\frac{1}{2}$	$9\frac{7}{8}$	
$1\frac{1}{2}$	11.85	$15\frac{3}{4}$	$10\frac{1}{8}$	
$1\frac{3}{4}$	12.25	$15\frac{3}{4}$	$9\frac{1}{2}$	
$1\frac{3}{4}$	12.60	16	$9\frac{1}{2}$	
$1\frac{3}{4}$	12.90	16	$9\frac{1}{2}$	
$1\frac{1}{2}$	13.20	$16\frac{1}{4}$	$10\frac{1}{8}$	
$1\frac{3}{4}$	13.50	$16\frac{1}{4}$	$10\frac{1}{8}$	
$1\frac{7}{8}$	13.80	$16\frac{1}{2}$	$10\frac{3}{8}$	
$1\frac{3}{4}$	14.05	$16\frac{1}{2}$	$10\frac{3}{8}$	
$1\frac{1}{2}$	14.25	$16\frac{1}{2}$	$10\frac{1}{4}$	
$1\frac{3}{4}$	14.50	$16\frac{1}{2}$	$10\frac{1}{4}$	
2	14.70	$16\frac{1}{2}$	$10\frac{1}{4}$	

64th Sizes not listed furnished at price of next larger size.

**No. 120 F-F.**  
**THREE-GROOVE CHUCKING REAMERS**  
 WITH HOLES THROUGH SOLID METAL FOR LUBRICANT,  
 AND MORSE TAPER SHANKS.



Diameter, Inches.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.	Morse Taper Shank.
$2\frac{1}{32}$	\$14.80	$16\frac{1}{2}$	$9\frac{1}{2}$	No. 5.
$2\frac{1}{16}$	14.85	17	10	
$2\frac{3}{32}$	15.30	17	10	
$2\frac{1}{8}$	15.70	17	10	
$2\frac{5}{32}$	16.25	17	10	
$2\frac{3}{16}$	16.80	17	10	
$2\frac{7}{32}$	17.40	$17\frac{1}{2}$	$10\frac{1}{2}$	
$2\frac{1}{4}$	17.95	$17\frac{1}{2}$	$10\frac{1}{8}$	
$2\frac{9}{32}$	18.50	$17\frac{1}{2}$	$10\frac{1}{8}$	
$2\frac{5}{16}$	19.00	$17\frac{1}{2}$	$10\frac{1}{8}$	
$2\frac{11}{32}$	19.60	18	$10\frac{5}{8}$	
$2\frac{3}{8}$	20.15	18	$10\frac{1}{2}$	
$2\frac{13}{32}$	20.60	$18\frac{1}{2}$	11	
$2\frac{7}{16}$	21.00	$18\frac{1}{2}$	11	
$2\frac{15}{32}$	21.45	19	$11\frac{1}{2}$	
$2\frac{1}{2}$	21.85	19	$11\frac{3}{8}$	
$2\frac{17}{32}$	22.30	$19\frac{1}{4}$	$11\frac{5}{8}$	
$2\frac{9}{16}$	22.70	$19\frac{1}{4}$	$11\frac{5}{8}$	
$2\frac{19}{32}$	23.10	$19\frac{1}{2}$	$11\frac{7}{8}$	
$2\frac{5}{8}$	23.50	$19\frac{1}{2}$	$11\frac{3}{4}$	
$2\frac{21}{32}$	24.25	20	$12\frac{1}{4}$	
$2\frac{11}{16}$	25.00	20	$12\frac{1}{4}$	
$2\frac{23}{32}$	25.80	$20\frac{1}{2}$	$12\frac{3}{4}$	
$2\frac{3}{4}$	26.60	$20\frac{1}{2}$	$12\frac{5}{8}$	
$2\frac{25}{32}$	27.30	$20\frac{1}{2}$	$12\frac{5}{8}$	
$2\frac{13}{16}$	28.00	$20\frac{1}{2}$	$12\frac{5}{8}$	
$2\frac{27}{32}$	28.70	21	$13\frac{1}{8}$	
$2\frac{7}{8}$	29.40	21	13	
$2\frac{29}{32}$	30.80	21	13	
$2\frac{15}{16}$	32.20	21	13	
$2\frac{31}{32}$	33.60	22	14	
3	35.00	22	$13\frac{7}{8}$	

64th sizes not listed furnished at price of next larger size.

## No. 120 F-G. THREE-GROOVE CHUCKING REAMERS

WITH HOLES THROUGH SOLID METAL FOR LUBRICANT,  
AND STRAIGHT SHANKS.



These Reamers are specially adapted for enlarging cored holes and have shank and fluted portion ground on centers to size. Special lengths made to order at special prices.

These Reamers can be made to be used in same manner as oil drills illustrated on pages 115 to 143 inclusive.

Reamers shown above are to be used for passing completely through the work.

Diameter, Inches.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.	Diameter of Shank, Inches.	Length of Shank, Inches.
$\frac{3}{8}$	\$2.75	$6\frac{3}{4}$	$4\frac{1}{4}$	$\frac{3}{8}$	$1\frac{3}{4}$
$\frac{7}{16}$	2.75	7	$4\frac{1}{2}$	$\frac{3}{8}$	$1\frac{3}{4}$
$\frac{1}{2}$	2.75	7	$4\frac{1}{2}$	$\frac{3}{8}$	$1\frac{3}{4}$
$\frac{9}{16}$	2.75	$7\frac{1}{4}$	$4\frac{3}{4}$	$\frac{3}{8}$	$1\frac{3}{4}$
$\frac{5}{8}$	2.85	$7\frac{1}{4}$	$4\frac{3}{4}$	$\frac{3}{8}$	$1\frac{3}{4}$
$\frac{3}{4}$	2.85	$7\frac{1}{2}$	5	$\frac{3}{8}$	$1\frac{3}{4}$
$\frac{7}{8}$	2.85	$7\frac{1}{2}$	5	$\frac{3}{8}$	$1\frac{3}{4}$
$\frac{1}{2}$	2.85	$7\frac{3}{4}$	5	$\frac{1}{2}$	2
$\frac{3}{4}$	2.85	$7\frac{3}{4}$	5	$\frac{1}{2}$	2
$\frac{7}{8}$	2.95	8	$5\frac{1}{4}$	$\frac{1}{2}$	2
$\frac{1}{2}$	2.95	8	$5\frac{1}{4}$	$\frac{1}{2}$	2
$\frac{3}{4}$	3.00	$8\frac{1}{4}$	$5\frac{1}{2}$	$\frac{1}{2}$	2
$\frac{7}{8}$	3.00	$8\frac{1}{4}$	$5\frac{1}{2}$	$\frac{1}{2}$	2
$\frac{1}{2}$	3.45	$8\frac{1}{2}$	$5\frac{3}{4}$	$\frac{1}{2}$	2
$\frac{3}{4}$	3.45	$8\frac{1}{2}$	$5\frac{3}{4}$	$\frac{1}{2}$	2
$\frac{7}{8}$	3.90	$8\frac{3}{4}$	$5\frac{3}{4}$	$\frac{5}{8}$	$2\frac{1}{4}$
$\frac{1}{2}$	3.90	$8\frac{3}{4}$	$5\frac{3}{4}$	$\frac{5}{8}$	$2\frac{1}{4}$
$\frac{3}{4}$	4.00	9	6	$\frac{5}{8}$	$2\frac{1}{4}$
$\frac{7}{8}$	4.00	9	6	$\frac{5}{8}$	$2\frac{1}{4}$
$\frac{1}{2}$	4.15	$9\frac{1}{4}$	$6\frac{1}{4}$	$\frac{5}{8}$	$2\frac{1}{4}$
$\frac{3}{4}$	4.15	$9\frac{1}{4}$	$6\frac{1}{4}$	$\frac{5}{8}$	$2\frac{1}{4}$
$\frac{7}{8}$	4.25	$9\frac{1}{2}$	$6\frac{1}{2}$	$\frac{5}{8}$	$2\frac{1}{4}$
$\frac{1}{2}$	4.25	$9\frac{1}{2}$	$6\frac{1}{2}$	$\frac{5}{8}$	$2\frac{1}{4}$
$\frac{3}{4}$	4.35	$9\frac{3}{4}$	$6\frac{3}{4}$	$\frac{3}{4}$	$2\frac{1}{4}$
$\frac{7}{8}$	4.35	$9\frac{3}{4}$	$6\frac{3}{4}$	$\frac{3}{4}$	$2\frac{1}{4}$

**No. 120 F-G.**  
**THREE-GROOVE CHUCKING REAMERS**  
 WITH HOLES THROUGH SOLID METAL FOR LUBRICANT,  
 AND STRAIGHT SHANKS.



Diameter, Inches.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.	Diameter of Shank, Inches.	Length of Shank, Inches.
$\frac{49}{64}$	\$4.50	$9\frac{7}{8}$	$6\frac{7}{8}$	$\frac{3}{4}$	$2\frac{1}{4}$
$\frac{51}{64}$	4.50	$9\frac{7}{8}$	$6\frac{7}{8}$	$\frac{3}{4}$	$2\frac{1}{4}$
$\frac{53}{64}$	4.60	10	7	$\frac{3}{4}$	$2\frac{1}{4}$
$\frac{55}{64}$	4.60	10	7	$\frac{3}{4}$	$2\frac{1}{4}$
$\frac{57}{64}$	4.70	$10\frac{1}{4}$	$7\frac{1}{4}$	$\frac{3}{4}$	$2\frac{1}{4}$
$\frac{59}{64}$	4.70	$10\frac{1}{4}$	$7\frac{1}{4}$	$\frac{3}{4}$	$2\frac{1}{4}$
$\frac{61}{64}$	4.80	$10\frac{1}{2}$	$7\frac{1}{4}$	$\frac{7}{8}$	$2\frac{1}{2}$
$\frac{63}{64}$	4.80	$10\frac{1}{2}$	$7\frac{1}{4}$	$\frac{7}{8}$	$2\frac{1}{2}$
$\frac{65}{64}$	4.95	$10\frac{5}{8}$	$7\frac{3}{8}$	$\frac{7}{8}$	$2\frac{1}{2}$
$\frac{67}{64}$	4.95	$10\frac{5}{8}$	$7\frac{3}{8}$	$\frac{7}{8}$	$2\frac{1}{2}$
$\frac{69}{64}$	5.10	$10\frac{3}{4}$	$7\frac{1}{2}$	$\frac{7}{8}$	$2\frac{1}{2}$
$\frac{71}{64}$	5.10	$10\frac{3}{4}$	$7\frac{1}{2}$	$\frac{7}{8}$	$2\frac{1}{2}$
$\frac{73}{64}$	5.25	$10\frac{7}{8}$	$7\frac{5}{8}$	$\frac{7}{8}$	$2\frac{1}{2}$
$\frac{75}{64}$	5.25	$10\frac{7}{8}$	$7\frac{5}{8}$	$\frac{7}{8}$	$2\frac{1}{2}$
$\frac{77}{64}$	5.40	11	$7\frac{1}{2}$	1	$2\frac{3}{4}$
$\frac{79}{64}$	5.40	11	$7\frac{1}{2}$	1	$2\frac{3}{4}$
$1\frac{1}{64}$	5.55	$11\frac{1}{8}$	$7\frac{5}{8}$	1	$2\frac{3}{4}$
$1\frac{1}{32}$	5.55	$11\frac{1}{8}$	$7\frac{5}{8}$	1	$2\frac{3}{4}$
$1\frac{1}{16}$	5.70	$11\frac{1}{4}$	$7\frac{3}{4}$	1	$2\frac{3}{4}$
$1\frac{1}{8}$	5.70	$11\frac{1}{4}$	$7\frac{3}{4}$	1	$2\frac{3}{4}$
$1\frac{1}{4}$	5.85	$11\frac{1}{2}$	8	1	$2\frac{3}{4}$
$1\frac{1}{2}$	5.85	$11\frac{1}{2}$	8	1	$2\frac{3}{4}$
$1\frac{3}{4}$	6.00	$11\frac{3}{4}$	$8\frac{1}{4}$	1	$2\frac{3}{4}$
$1\frac{7}{8}$	6.00	$11\frac{3}{4}$	$8\frac{1}{4}$	1	$2\frac{3}{4}$
$1\frac{9}{8}$	6.40	$11\frac{7}{8}$	$8\frac{3}{8}$	1	$2\frac{3}{4}$
$1\frac{5}{4}$	6.40	$11\frac{7}{8}$	$8\frac{3}{8}$	1	$2\frac{3}{4}$
$1\frac{11}{8}$	6.75	12	$8\frac{1}{2}$	1	$2\frac{3}{4}$
$1\frac{13}{8}$	6.75	12	$8\frac{1}{2}$	1	$2\frac{3}{4}$
$1\frac{7}{4}$	6.95	$12\frac{1}{8}$	$8\frac{5}{8}$	1	$2\frac{3}{4}$
$1\frac{9}{4}$	6.95	$12\frac{1}{8}$	$8\frac{5}{8}$	1	$2\frac{3}{4}$
$1\frac{11}{4}$	7.20	$12\frac{1}{2}$	$8\frac{3}{4}$	$1\frac{1}{4}$	3
$1\frac{13}{4}$	7.20	$12\frac{1}{2}$	$8\frac{3}{4}$	$1\frac{1}{4}$	3

**No. 120 F-G.**  
**THREE-GROOVE CHUCKING REAMERS**  
 WITH HOLES THROUGH SOLID METAL FOR LUBRICANT,  
 AND STRAIGHT SHANKS.



Diameter, Inches.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.	Diameter of Shank, Inches.	Length of Shank, Inches.
1 1/4	\$7.40	14 1/8	10 3/8	1 1/4	3
1 3/8	7.40	14 1/8	10 3/8	1 1/4	3
1 1/2	7.80	14 1/4	10 1/2	1 1/4	3
1 5/8	7.80	14 1/4	10 1/2	1 1/4	3
1 3/4	8.10	14 3/8	10 5/8	1 1/4	3
1 7/8	8.10	14 3/8	10 5/8	1 1/4	3
2	8.40	14 1/2	10 3/4	1 1/4	3
2 1/8	8.40	14 1/2	10 3/4	1 1/4	3
2 1/4	8.70	14 5/8	10 7/8	1 1/4	3
2 3/8	8.70	14 5/8	10 7/8	1 1/4	3
2 1/2	9.00	14 3/4	11	1 1/4	3
2 5/8	9.00	14 3/4	11	1 1/4	3
2 3/4	9.30	14 7/8	11 1/8	1 1/4	3
2 7/8	9.30	14 7/8	11 1/8	1 1/4	3
3	9.60	15	11 1/4	1 1/4	3
3 1/8	9.60	15	11 1/4	1 1/4	3
3 1/4	10.00	15	11 1/4	1 1/4	3
3 1/2	10.35	15 1/4	11 1/2	1 1/4	3
3 3/8	10.75	15 1/4	11 1/2	1 1/4	3
3 1/2	11.10	15 1/2	11 3/4	1 1/4	3
3 3/4	11.50	15 1/2	11 3/4	1 1/4	3
3 7/8	11.85	15 3/4	12	1 1/4	3
4	12.25	15 3/4	12	1 1/4	3
4 1/8	12.60	16	11 7/8	1 1/4	3
4 1/4	12.90	16	11 7/8	1 1/4	3
4 1/2	13.20	16 1/4	12 1/8	1 1/4	3
4 3/4	13.50	16 1/4	12 1/8	1 1/4	3
4 7/8	13.80	16 1/2	12 1/4	1 1/4	3
5	14.05	16 1/2	12 1/4	1 1/4	3
5 1/8	14.25	16 1/2	12 1/4	1 1/4	3
5 1/4	14.50	16 1/2	12 1/4	1 1/4	3
5 1/2	14.70	16 1/2	12 1/8	1 1/4	3

64th sizes not listed furnished at price of next larger size.

**No. 120 F-G.**  
**THREE-GROOVE CHUCKING REAMERS**  
 WITH HOLES THROUGH SOLID METAL FOR LUBRICANT,  
 AND STRAIGHT SHANKS.



Diameter, Inches.	Price Each.	Whole Length, Inches.	Twist Cut, Inches.	Diameter of Shank, Inches	Length of Shank, Inches.
$2\frac{1}{32}$	\$14.80	$16\frac{1}{2}$	$11\frac{3}{4}$	$1\frac{1}{2}$	$3\frac{1}{2}$
$2\frac{1}{16}$	14.85	17	$12\frac{1}{4}$	$1\frac{1}{2}$	$3\frac{1}{2}$
$2\frac{3}{32}$	15.30	17	$12\frac{1}{4}$	$1\frac{1}{2}$	$3\frac{1}{2}$
$2\frac{1}{8}$	15.70	17	$12\frac{1}{8}$	$1\frac{1}{2}$	$3\frac{1}{2}$
$2\frac{5}{32}$	16.25	17	$12\frac{1}{8}$	$1\frac{1}{2}$	$3\frac{1}{2}$
$2\frac{3}{16}$	16.80	17	$12\frac{1}{8}$	$1\frac{1}{2}$	$3\frac{1}{2}$
$2\frac{7}{32}$	17.40	$17\frac{1}{2}$	$12\frac{5}{8}$	$1\frac{1}{2}$	$3\frac{1}{2}$
$2\frac{1}{4}$	17.95	$17\frac{1}{2}$	$12\frac{1}{2}$	$1\frac{1}{2}$	$3\frac{1}{2}$
$2\frac{9}{32}$	18.50	$17\frac{1}{2}$	$12\frac{1}{2}$	$1\frac{1}{2}$	$3\frac{1}{2}$
$2\frac{5}{16}$	19.00	$17\frac{1}{2}$	$12\frac{1}{2}$	$1\frac{1}{2}$	$3\frac{1}{2}$
$2\frac{11}{32}$	19.60	18	13	$1\frac{1}{2}$	$3\frac{1}{2}$
$2\frac{3}{8}$	20.15	18	$12\frac{7}{8}$	$1\frac{1}{2}$	$3\frac{1}{2}$
$2\frac{13}{32}$	20.60	$18\frac{1}{2}$	$13\frac{3}{8}$	$1\frac{1}{2}$	$3\frac{1}{2}$
$2\frac{7}{16}$	21.00	$18\frac{1}{2}$	$13\frac{3}{8}$	$1\frac{1}{2}$	$3\frac{1}{2}$
$2\frac{15}{32}$	21.45	19	$13\frac{7}{8}$	$1\frac{1}{2}$	$3\frac{1}{2}$
$2\frac{1}{2}$	21.85	19	$13\frac{3}{4}$	$1\frac{1}{2}$	$3\frac{1}{2}$
$2\frac{17}{32}$	22.30	$19\frac{1}{4}$	14	$1\frac{1}{2}$	$3\frac{1}{2}$
$2\frac{9}{16}$	22.70	$19\frac{1}{4}$	14	$1\frac{1}{2}$	$3\frac{1}{2}$
$2\frac{19}{32}$	23.10	$19\frac{1}{2}$	$14\frac{1}{4}$	$1\frac{1}{2}$	$3\frac{1}{2}$
$2\frac{5}{8}$	23.50	$19\frac{1}{2}$	$14\frac{1}{8}$	$1\frac{1}{2}$	$3\frac{1}{2}$
$2\frac{21}{32}$	24.25	20	$14\frac{5}{8}$	$1\frac{1}{2}$	$3\frac{1}{2}$
$2\frac{11}{16}$	25.00	20	$14\frac{5}{8}$	$1\frac{1}{2}$	$3\frac{1}{2}$
$2\frac{23}{32}$	25.80	$20\frac{1}{2}$	$15\frac{1}{8}$	$1\frac{1}{2}$	$3\frac{1}{2}$
$2\frac{3}{4}$	26.60	$20\frac{1}{2}$	15	$1\frac{1}{2}$	$3\frac{1}{2}$
$2\frac{25}{32}$	27.30	$20\frac{1}{2}$	$14\frac{1}{2}$	$1\frac{3}{4}$	4
$2\frac{13}{16}$	28.00	$20\frac{1}{2}$	$14\frac{1}{2}$	$1\frac{3}{4}$	4
$2\frac{27}{32}$	28.70	21	15	$1\frac{3}{4}$	4
$2\frac{7}{8}$	29.40	21	$14\frac{7}{8}$	$1\frac{3}{4}$	4
$2\frac{29}{32}$	30.80	21	$14\frac{7}{8}$	$1\frac{3}{4}$	4
$2\frac{15}{16}$	32.20	21	$14\frac{7}{8}$	$1\frac{3}{4}$	4
$2\frac{31}{32}$	33.60	22	$15\frac{7}{8}$	$1\frac{3}{4}$	4
3	35.00	22	$15\frac{3}{4}$	$1\frac{3}{4}$	4

64th sizes not listed furnished at price of next larger size.

## No. 120 F-H.

## FOUR GROOVE CHUCKING REAMERS

WITH MORSE TAPER SHANKS.



Diameter, Inches.	Price Each.	Whole Length, Inches.	Length of Flutes, Inches.	Length of Body, Inches.	Morse Taper Shank, Number.
$\frac{5}{8}$	\$1.90	9	2	$3\frac{1}{8}$	2
$\frac{11}{16}$	2.00	9	2	$3\frac{1}{8}$	2
$\frac{3}{4}$	2.20	$9\frac{1}{2}$	2	$4\frac{1}{16}$	2
$\frac{25}{32}$	2.30	$9\frac{1}{2}$	2	$4\frac{1}{16}$	2
$\frac{13}{16}$	2.40	$9\frac{1}{2}$	2	$4\frac{1}{16}$	2
$\frac{27}{32}$	2.50	$9\frac{1}{2}$	2	$4\frac{1}{16}$	2
$\frac{7}{8}$	2.55	10	2	$4\frac{1}{8}$	2
$\frac{29}{32}$	2.60	10	2	$4\frac{1}{8}$	2
$\frac{15}{16}$	2.65	10	$2\frac{1}{4}$	4	3
$\frac{31}{32}$	2.70	10	$2\frac{1}{4}$	4	3
1	2.75	$10\frac{1}{2}$	$2\frac{1}{4}$	$4\frac{1}{2}$	3
$1\frac{1}{32}$	2.80	$10\frac{1}{2}$	$2\frac{1}{4}$	$4\frac{1}{2}$	3
$1\frac{1}{16}$	2.85	$10\frac{1}{2}$	$2\frac{1}{4}$	$4\frac{1}{2}$	3
$1\frac{3}{32}$	2.95	$10\frac{1}{2}$	$2\frac{1}{4}$	$4\frac{1}{2}$	3
$1\frac{1}{8}$	3.10	11	$2\frac{1}{2}$	$4\frac{3}{4}$	3
$1\frac{5}{32}$	3.20	11	$2\frac{1}{2}$	$4\frac{3}{4}$	3
$1\frac{3}{16}$	3.30	11	$2\frac{1}{2}$	$4\frac{3}{4}$	3

These Reamers are made .010 inch under size and are intended to be used as roughing reamers for Floating Reamers No. 119D and Floating Expansion Reamers No. 119 E listed on page 191.

For Sockets designed for use with these Reamers see page 12.



## No. 120 G.

## EXPANSION REAMERS.



Diameter, Inches.	Price Each.	Whole Length, Inches.	Length of Flutes Inches.	Diameter, Inches.	Price Each.	Whole Length, Inches.	Length of Flutes Inches.
$\frac{1}{4}$	\$3.00	4	$1\frac{1}{2}$	$1\frac{3}{32}$	\$9.20	11	5
$\frac{5}{32}$	3.05	4	$1\frac{1}{2}$	$1\frac{1}{8}$	9.50	11	5
$\frac{3}{16}$	3.10	4	$1\frac{1}{2}$	$1\frac{1}{16}$	10.00	11	5
$\frac{1}{8}$	3.15	4	$1\frac{1}{2}$	$1\frac{3}{16}$	10.50	$11\frac{1}{2}$	$5\frac{1}{4}$
$\frac{3}{8}$	3.20	5	2	$1\frac{1}{2}$	11.00	$11\frac{1}{2}$	$5\frac{1}{4}$
$\frac{7}{16}$	3.25	5	2	$1\frac{5}{8}$	11.50	$11\frac{1}{2}$	$5\frac{1}{4}$
$\frac{1}{2}$	3.30	5	2	$1\frac{3}{4}$	12.00	$11\frac{1}{2}$	$5\frac{1}{4}$
$\frac{9}{16}$	3.35	5	2	$1\frac{7}{8}$	12.50	12	$5\frac{1}{2}$
$\frac{5}{8}$	3.40	6	$2\frac{1}{2}$	$1\frac{15}{8}$	13.00	12	$5\frac{1}{2}$
$\frac{3}{4}$	3.50	6	$2\frac{1}{2}$	$1\frac{1}{2}$	13.50	$12\frac{1}{2}$	$5\frac{3}{4}$
$\frac{7}{8}$	3.65	6	$2\frac{1}{2}$	$1\frac{1}{4}$	14.00	$12\frac{1}{2}$	$5\frac{3}{4}$
$\frac{15}{16}$	3.80	6	$2\frac{1}{2}$	$1\frac{3}{4}$	14.50	13	6
$\frac{1}{2}$	4.00	7	3	$1\frac{1}{2}$	15.00	13	6
$\frac{3}{4}$	4.20	7	3	$1\frac{7}{8}$	15.50	$13\frac{1}{2}$	$6\frac{1}{4}$
$\frac{7}{8}$	4.40	7	3	$1\frac{1}{4}$	16.00	$13\frac{1}{2}$	$6\frac{1}{4}$
$\frac{15}{16}$	4.60	7	3	2	16.50	14	$6\frac{1}{2}$
$\frac{1}{2}$	4.80	8	$3\frac{1}{2}$	$2\frac{1}{8}$	17.00	14	$6\frac{1}{2}$
$\frac{3}{4}$	5.00	8	$3\frac{1}{2}$	$2\frac{1}{4}$	17.50	$14\frac{1}{2}$	$6\frac{3}{4}$
$\frac{7}{8}$	5.25	8	$3\frac{1}{2}$	$2\frac{3}{8}$	18.00	$14\frac{1}{2}$	$6\frac{3}{4}$
$\frac{15}{16}$	5.50	8	$3\frac{1}{2}$	$2\frac{1}{2}$	18.50	15	7
$\frac{1}{2}$	5.75	9	4	$2\frac{5}{8}$	19.00	15	7
$\frac{3}{4}$	6.00	9	4	$2\frac{3}{4}$	19.50	$15\frac{1}{2}$	$7\frac{1}{4}$
$\frac{7}{8}$	6.25	9	4	$2\frac{7}{8}$	20.00	$15\frac{1}{2}$	$7\frac{1}{4}$
$\frac{15}{16}$	6.50	9	4	$2\frac{1}{2}$	20.50	16	$7\frac{1}{2}$
$\frac{1}{2}$	6.75	10	$4\frac{1}{2}$	$2\frac{9}{16}$	22.00	16	$7\frac{1}{2}$
$\frac{3}{4}$	7.00	10	$4\frac{1}{2}$	$2\frac{5}{8}$	23.50	$16\frac{1}{2}$	$7\frac{3}{4}$
$\frac{7}{8}$	7.25	10	$4\frac{1}{2}$	$2\frac{1}{4}$	25.00	$16\frac{1}{2}$	$7\frac{3}{4}$
$\frac{15}{16}$	7.50	10	$4\frac{1}{2}$	$2\frac{3}{4}$	26.50	17	8
$\frac{1}{2}$	7.75	$10\frac{1}{2}$	$4\frac{3}{4}$	$2\frac{1}{2}$	28.00	17	8
$\frac{3}{4}$	8.00	$10\frac{1}{2}$	$4\frac{3}{4}$	$2\frac{7}{8}$	30.00	$17\frac{1}{2}$	$8\frac{1}{4}$
$\frac{7}{8}$	8.30	$10\frac{1}{2}$	$4\frac{3}{4}$	$2\frac{1}{2}$	32.00	$17\frac{1}{2}$	$8\frac{1}{4}$
$\frac{15}{16}$	8.60	$10\frac{1}{2}$	$4\frac{3}{4}$	3	34.00	$17\frac{1}{2}$	$8\frac{1}{4}$
$\frac{1}{2}$	8.90	11	5				

Limits of expansion recommended for these Reamers are as follows: Sizes  $\frac{1}{4}$  to  $\frac{15}{16}$  .005 inch;  $\frac{1}{2}$  to  $\frac{11}{16}$  .008 inch;  $1"$  to  $1\frac{1}{16}$  .010 inch;  $1\frac{1}{8}"$  to  $2\frac{1}{16}"$  .012 inch;  $2\frac{1}{8}"$  to  $3"$  .015 inch.

The guides to these Reamers are ground .005 inch under size.

## No. 120 ½ G.

## EXPANSION REAMERS.

## MILLIMETER SIZES.



Diam., M. M.	Price Each.	Whole Length, M. M.	Length of Flutes M. M.	Diam., M. M.	Price Each.	Whole Length, M. M.	Length of Flutes M. M.
6	\$3.00	102	38	29	\$8.00	267	121
7	3.05	102	38	30	8.30	267	121
8	3.15	102	38	31	8.90	267	121
9	3.20	127	51	32	9.20	279	127
10	3.25	127	51	33	9.50	279	127
11	3.30	127	51	34	10.00	279	127
12	3.40	127	51	35	11.00	292	133
13	3.50	152	63	36	11.50	292	133
14	3.65	152	63	37	12.00	292	133
15	3.80	152	63	38	12.50	305	140
16	4.20	178	76	39	13.00	305	140
17	4.40	178	76	40	13.25	305	140
18	4.60	178	76	41	13.50	317	146
19	4.80	203	89	42	13.75	317	146
20	5.25	203	89	43	14.25	317	146
21	5.50	203	89	44	14.50	330	152
22	5.75	229	102	45	14.75	330	152
23	6.00	229	102	46	15.00	330	152
24	6.50	229	102	47	15.50	343	159
25	6.75	254	114	48	15.75	343	159
26	7.00	254	114	49	16.00	343	159
27	7.25	254	114	50	16.25	343	159
28	7.75	267	121				

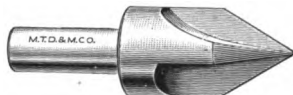
Limits of expansion recommended for these Reamers are as follows: Sizes 6 to 12 M. M. .005 inch; 13 to 25 M. M. .008 inch; 26 to 44 M. M. .010 inch; 45 to 50 M. M. .012 inch. The Guides to these Reamers are ground .005 inch undersize.

## No. 120 H. CENTER REAMERS.

INCLUDED ANGLE 60°

STYLE NO. 1.

STYLE NO. 2.



These Reamers with included Angle of 72 and 82 degrees furnished at regular prices.

Size Cut Inches.	STYLE NO. 1.		STYLE NO. 2.		Whole Length, Inches.	Diam. Shank, Inches.	Length Shank, Inches.
	Price Per Dozen.	Price Each.	Price Per Dozen.	Price Each.			
1/4	\$2.50	\$.22	\$2.90	\$.25	1 1/2	3/16	3/4
3/8	2.90	.25	3.25	.30	1 1/8	1/4	7/8
1/2	3.25	.30	3.75	.35	2	3/8	7/8
5/8	6.00	.50	7.00	.60	2 1/8	3/8	7/8
3/4	8.00	.70	8.50	.75	2 3/8	1/2	1

Other angles made to order at special prices.

## WRENCH FOR ADJUSTABLE REAMERS.

STYLES NOS. 120 E, 120 1/2 E AND 120 N.



A Wrench furnished with each Reamer.

No. of Wrench	Fitting Reamers, Inches.	No. of Wrench	Fitting Reamers, Inches.	No. of Wrench	Fitting Reamers, Inches.	No. of Wrench	Fitting Reamers, Inches.
3	1	9	1 1/8 & 1 3/4	15	2 1/2 & 2 9/16	21	3 1/4 & 3 5/16
4	1 1/16 & 1 1/8	10	1 1/8 & 1 7/8	16	2 5/8 & 2 11/16	22	3 3/8 & 3 7/16
5	1 1/8 & 1 1/4	11	1 1/8, 2, 2 1/16	17	2 3/4 & 2 13/16	23	3 1/2 & 3 9/16
6	1 1/8 & 1 3/8	12	2 1/8 & 2 3/16	18	2 7/8 & 2 15/16	24	3 5/8 & 3 11/16
7	1 7/16 & 1 1/2	13	2 1/4 & 2 5/16	19	3 & 3 1/16	25	3 3/4 & 3 13/16
8	1 9/16 & 1 5/8	14	2 3/8 & 2 7/16	20	3 1/8 & 3 3/8	26	3 7/8 & 3 15/16
						27	4

For additional wrenches prices quoted on application.  
For No. 120 J see page 236.

## No. 120 K. EXPANDING REAMERS.



Diameter, Inches.	Price Each.	Whole Length, Inches.	Diameter, Inches.	Price Each.	Whole Length, Inches.
$\frac{3}{4}$	\$4.00	$7\frac{1}{8}$	$1\frac{1}{8}$	\$7.40	$12\frac{3}{8}$
$\frac{1}{2}$	4.40	$8\frac{1}{8}$	$1\frac{1}{2}$	7.80	$12\frac{1}{2}$
$\frac{7}{8}$	4.70	$8\frac{3}{8}$	$1\frac{3}{8}$	8.20	$12\frac{1}{4}$
$\frac{1}{4}$	5.00	$8\frac{1}{2}$	$1\frac{5}{8}$	8.50	$13\frac{1}{8}$
1	5.30	$9\frac{1}{8}$	$1\frac{3}{4}$	8.80	$13\frac{1}{4}$
$1\frac{1}{8}$	5.60	$9\frac{3}{8}$	$1\frac{7}{8}$	9.10	$14\frac{1}{8}$
$1\frac{1}{4}$	5.90	$10\frac{1}{8}$	$1\frac{1}{2}$	9.40	$14\frac{1}{4}$
$1\frac{3}{8}$	6.20	$10\frac{3}{8}$	$1\frac{5}{8}$	9.60	$14\frac{3}{8}$
$1\frac{1}{2}$	6.50	$10\frac{1}{2}$	$1\frac{3}{4}$	9.80	$15\frac{1}{8}$
$1\frac{5}{8}$	6.80	$11\frac{1}{8}$	2	10.00	$15\frac{1}{4}$
$1\frac{3}{4}$	7.10	$11\frac{3}{8}$			

These Reamers have an expansion of .009 inch.

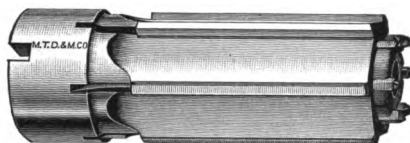
## No. 120½ K. EXPANDING REAMERS. WITH MORSE TAPER SHANKS.



Diameter, Inches.	Price Each.	Whole Length, Inches.	Morse Taper Shank, Number.	Diameter, Inches.	Price Each.	Whole Length, Inches.	Morse Taper Shank, Number.
$\frac{3}{4}$	\$4.00	$9\frac{1}{2}$	2	$1\frac{1}{8}$	\$7.40	12	4
$\frac{1}{2}$	4.40	$9\frac{1}{2}$	2	$1\frac{1}{2}$	7.80	$12\frac{1}{2}$	4
$\frac{7}{8}$	4.70	10	2	$1\frac{3}{8}$	8.20	$12\frac{1}{4}$	4
$\frac{1}{4}$	5.00	10	3	$1\frac{5}{8}$	8.50	13	4
1	5.30	$10\frac{1}{2}$	3	$1\frac{7}{8}$	8.80	13	4
$1\frac{1}{8}$	5.60	$10\frac{1}{2}$	3	$1\frac{3}{4}$	9.10	$13\frac{1}{2}$	5
$1\frac{1}{4}$	5.90	11	3	$1\frac{1}{2}$	9.40	$13\frac{1}{2}$	5
$1\frac{3}{8}$	6.20	11	3	$1\frac{5}{8}$	9.60	14	5
$1\frac{1}{2}$	6.50	$11\frac{1}{2}$	4	$1\frac{3}{4}$	9.80	14	5
$1\frac{5}{8}$	6.80	$11\frac{1}{2}$	4	2	10.00	14	5
$1\frac{3}{4}$	7.10	12	4				

The cuts show the construction of the Expanding Reamers. Wedge-shaped pins are adjusted to the blades and driving the pins increases the diameter of the Reamers. When new blades or pins are required, the Reamer should accompany the order. Expanding Reamers are not furnished smaller than  $\frac{3}{4}$  inch diameter. These Reamers have an expansion of .009 inch.

## No. 120 M. EXPANDING SHELL REAMERS.



The cut shows the construction of the Expanding Shell Reamer. Wedge-shaped pins are adjusted to the blades and driving the pins increases the diameter of the Reamer. When new blades or pins are required, the Reamer should accompany the order. The Reamers can be increased but not reduced in size. Special sizes of larger diameter than 4 inches furnished to order at special prices.

Diameter, Inches.	Price Each.	Whole Length, Inches.	Morse Taper Hole.
$1\frac{3}{8}$	\$9.20	$4\frac{11}{16}$	No. 2.
$1\frac{7}{16}$	9.60	$4\frac{11}{16}$	
$1\frac{1}{2}$	10.00	$4\frac{11}{16}$	
$1\frac{9}{16}$	10.50	$4\frac{11}{16}$	
$1\frac{5}{8}$	11.00	$4\frac{11}{16}$	
$1\frac{11}{16}$	11.50	$5\frac{3}{16}$	
$1\frac{3}{4}$	12.00	$5\frac{3}{16}$	
$1\frac{13}{16}$	12.75	$5\frac{3}{16}$	
$1\frac{7}{8}$	13.50	$5\frac{3}{16}$	No. 3.
$1\frac{15}{16}$	14.25	$5\frac{3}{16}$	
2	15.00	$5\frac{3}{16}$	
$2\frac{1}{16}$	15.25	$5\frac{3}{16}$	
$2\frac{1}{8}$	15.50	$5\frac{3}{16}$	
$2\frac{3}{16}$	15.75	$5\frac{3}{16}$	
$2\frac{1}{4}$	16.00	$5\frac{3}{16}$	
$2\frac{5}{16}$	16.25	$5\frac{7}{16}$	
$2\frac{3}{8}$	16.50	$5\frac{7}{16}$	No. 4.
$2\frac{7}{8}$	16.75	$5\frac{7}{16}$	
$2\frac{1}{2}$	17.00	$5\frac{7}{16}$	
$2\frac{9}{16}$	17.25	$5\frac{7}{16}$	
$2\frac{5}{8}$	17.50	$5\frac{7}{16}$	
$2\frac{11}{16}$	17.75	$5\frac{7}{16}$	
$2\frac{3}{4}$	18.00	$5\frac{7}{16}$	
$2\frac{13}{16}$	18.25	$5\frac{7}{16}$	
$2\frac{7}{8}$	18.50	$5\frac{7}{16}$	
$2\frac{15}{16}$	18.75	$5\frac{7}{16}$	

These Reamers have an expansion of .009 inch.

For Arbors fitting these Reamers see page 156

For Expanding Shell Reamers with straight holes see page 237.

**No. 120 M.****EXPANDING SHELL REAMERS.****No. 120 J.**

Diameter, Inches.	Price Each.	Whole Length, Inches.	Morse Taper Hole.
3	\$19.00	5 $\frac{7}{16}$	No. 4.
3 $\frac{1}{16}$	19.50	5 $\frac{7}{16}$	
3 $\frac{1}{8}$	20.00	5 $\frac{7}{16}$	
3 $\frac{3}{16}$	20.50	5 $\frac{7}{16}$	
3 $\frac{1}{4}$	21.00	5 $\frac{7}{16}$	
3 $\frac{5}{16}$	21.50	5 $\frac{7}{16}$	
3 $\frac{3}{8}$	22.00	6	No. 5.
3 $\frac{7}{16}$	22.50	6	
3 $\frac{1}{2}$	23.00	6	
3 $\frac{9}{16}$	23.50	6	
3 $\frac{5}{8}$	24.00	6	
3 $\frac{11}{16}$	24.50	6	
3 $\frac{3}{4}$	25.00	6	
3 $\frac{13}{16}$	25.75	6	
3 $\frac{7}{8}$	26.50	6	
3 $\frac{15}{16}$	27.25	6	
4	28.00	6	

These Reamers have an expansion of .009 inch.

For Arbors fitting these Reamers see page 156.

For Expanding Shell Reamers with straight holes see page 237.

**No. 120 J.****EXPANDING REAMERS.**

These Reamers are made to order only, and are not furnished smaller than  $\frac{3}{4}$  inch diameter.

In ordering state diameter at letters D and G, and the lengths as by letters A and B, also size and length of square. Wedge-shaped pins are adjusted to the blades of the Reamer and driving the pins increases its diameter.



# No. 120 M-A. EXPANSION SHELL REAMERS.

WITH STRAIGHT HOLES.

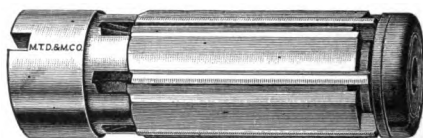


Diam. Inches.	Price Each.	Whole Length, Inches.	Size Hole, Inches.	Diam. Inches.	Price Each.	Whole Length, Inches.	Size Hole, Inches.
1 1/16	\$6.00	2 5/8	1/2	3 1/16	\$15.70	3	1
1 1/8	6.00	2 5/8	1/2	3 1/8	16.20	3	1
1 3/16	6.00	2 5/8	1/2	3 3/16	16.70	3	1
1 1/4	6.00	2 5/8	1/2	3 1/4	17.20	3 1/4	1 1/4
1 5/16	6.30	2 5/8	1/2	3 5/16	17.70	3 1/4	1 1/4
1 3/8	6.60	2 3/4	5/8	3 3/8	18.20	3 1/4	1 1/4
1 7/16	6.90	2 3/4	5/8	3 7/16	18.70	3 1/4	1 1/4
1 1/2	7.20	2 3/4	5/8	3 1/2	19.20	3 1/4	1 1/4
1 9/16	7.50	2 3/4	5/8	3 9/16	19.95	3 1/4	1 1/4
1 5/8	7.80	2 3/4	5/8	3 5/8	20.70	3 1/4	1 1/4
1 11/16	8.10	2 3/4	5/8	3 11/16	21.45	3 1/4	1 1/4
1 3/4	8.40	2 3/4	5/8	3 3/4	22.20	3 5/8	1 1/2
1 13/16	8.70	2 3/4	5/8	3 13/16	22.95	3 5/8	1 1/2
1 7/8	9.00	2 3/4	3/4	3 7/8	23.70	3 5/8	1 1/2
1 15/16	9.30	2 3/4	3/4	3 15/16	24.45	3 5/8	1 1/2
2	9.60	2 3/4	3/4	4	25.20	3 5/8	1 1/2
2 1/16	9.90	2 3/4	3/4	4 1/16	25.95	3 5/8	1 1/2
2 1/8	10.20	2 3/4	3/4	4 1/8	26.70	3 5/8	1 1/2
2 3/16	10.50	2 3/4	3/4	4 3/16	27.45	3 5/8	1 1/2
2 1/4	10.80	2 3/4	3/4	4 1/4	28.20	4	2
2 5/16	11.10	2 3/4	3/4	4 5/16	28.95	4	2
2 3/8	11.40	2 3/4	3/4	4 3/8	29.70	4	2
2 7/16	11.70	2 3/4	3/4	4 7/16	30.45	4	2
2 1/2	12.00	3	1	4 1/2	31.20	4	2
2 9/16	12.30	3	1	4 9/16	31.95	4	2
2 5/8	12.60	3	1	4 5/8	32.70	4	2
2 11/16	12.90	3	1	4 11/16	33.45	4	2
2 3/4	13.20	3	1	4 3/4	34.20	4	2
2 13/16	13.70	3	1	4 13/16	34.95	4	2
2 7/8	14.20	3	1	4 7/8	35.70	4	2
2 15/16	14.70	3	1	4 15/16	36.45	4	2
3	15.20	3	1	5	37.20	4	2

For Arbors fitting these Reamers see page 157 and 159.

For other Tools to be used in connection with these Reamers see pages 114, 157, 159, 181.

## No. 120N. ADJUSTABLE SHELL REAMERS.



PATENTED JUNE 5, 1900.

The cut shows the construction of our Patent Adjustable Shell Reamer. The wedge-shaped blades are held rigidly in slots by means of taper keys.

The bottom of the slots is inclined to the axis of the reamer, and the size may be adjusted by first driving back the keys, and turning the nut in the required direction. The keys should then be driven home to lock the blades.

This style of Adjustable Shell Reamer is not made smaller than  $1\frac{3}{8}$  inches, but can be made solid as small as  $\frac{3}{4}$  inch.

A Wrench furnished with each Reamer.

Diameter, Inches.	Price Each.	Whole Length, Inches.	Morse Taper Hole.	Diameter, Inches.	Price Each.	Whole Length, Inches.	Morse Taper Hole.
$1\frac{3}{8}$	\$10.60	$4\frac{7}{8}$	No. 2.	$2\frac{3}{4}$	20.70	6	No. 4.
$1\frac{7}{8}$	11.05	$4\frac{7}{8}$		$2\frac{1}{8}$	20.95	6	
$1\frac{1}{2}$	11.50	$4\frac{7}{8}$		$2\frac{7}{8}$	21.25	6	
$1\frac{9}{16}$	12.05	$4\frac{7}{8}$		$2\frac{1}{16}$	21.55	6	
$1\frac{5}{8}$	12.65	$4\frac{7}{8}$		3	21.85	6	
$1\frac{1}{16}$	13.20	$5\frac{1}{4}$	No. 3.	$3\frac{1}{16}$	22.40	6	No. 5.
$1\frac{3}{4}$	13.80	$5\frac{1}{4}$		$3\frac{1}{8}$	23.00	6	
$1\frac{1}{8}$	14.65	$5\frac{1}{4}$		$3\frac{3}{16}$	23.55	6	
$1\frac{7}{8}$	15.50	$5\frac{1}{4}$		$3\frac{1}{4}$	24.15	6	
$1\frac{1}{16}$	16.40	$5\frac{1}{4}$		$3\frac{5}{16}$	24.70	6	
2	17.25	$5\frac{1}{2}$	No. 4.	$3\frac{3}{8}$	25.30	$6\frac{1}{2}$	
$2\frac{1}{16}$	17.55	$5\frac{1}{2}$		$3\frac{7}{16}$	25.85	$6\frac{1}{2}$	
$2\frac{1}{8}$	17.85	$5\frac{1}{2}$		$3\frac{1}{2}$	26.45	$6\frac{1}{2}$	
$2\frac{3}{16}$	18.15	$5\frac{1}{2}$		$3\frac{9}{16}$	27.00	$6\frac{1}{2}$	
$2\frac{1}{4}$	18.40	$5\frac{1}{2}$		$3\frac{5}{8}$	27.60	$6\frac{1}{2}$	
$2\frac{5}{16}$	18.70	$5\frac{3}{4}$	No. 5.	$3\frac{11}{16}$	28.15	$6\frac{1}{2}$	
$2\frac{3}{8}$	19.00	$5\frac{3}{4}$		$3\frac{3}{4}$	28.75	$6\frac{1}{2}$	
$2\frac{7}{16}$	19.25	$5\frac{3}{4}$		$3\frac{1}{2}$	29.60	$6\frac{1}{2}$	
$2\frac{1}{2}$	19.55	$5\frac{3}{4}$		$3\frac{7}{8}$	30.45	$6\frac{1}{2}$	
$2\frac{9}{16}$	19.85	$5\frac{3}{4}$		$3\frac{1}{2}$	31.30	$6\frac{1}{2}$	
$2\frac{5}{8}$	20.10	6	No. 6.	4	32.20	$6\frac{1}{2}$	
$2\frac{1}{16}$	20.40	6					

These Reamers sizes  $1\frac{3}{8}$  inches to  $2\frac{5}{8}$  inches have an expansion of .009 inch; sizes  $2\frac{3}{4}$  inches to 4 inches an expansion of .012 inch.

For Arbors fitting these Reamers see page 156.



**No. 120 R.****STRAIGHT REAMERS WITH TAPER END**

FOR BOILER MAKERS, BRIDGE AND SHIP BUILDERS

WITH MORSE TAPER SHANKS.



Diameter Inches at A B C			Price Each.	Whole Length, Inches.	Length of Flutes, Inches.	Length of Taper B to C, Inches.	Morse Taper Shank.
$\frac{1}{4}$	$\frac{1}{4}$	$\frac{3}{16}$	\$2.75	$6\frac{3}{8}$	$3\frac{3}{8}$	1	No. 1.
$\frac{5}{16}$	$\frac{5}{16}$	$\frac{1}{4}$	2.75	$6\frac{3}{4}$	$3\frac{3}{4}$	1	
$\frac{3}{8}$	$\frac{3}{8}$	$\frac{5}{16}$	2.75	$7\frac{1}{4}$	4	1	
$\frac{7}{16}$	$\frac{7}{16}$	$\frac{3}{8}$	2.75	$8\frac{1}{4}$	$4\frac{3}{8}$	1	
$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{4}$	2.75	9	$5\frac{1}{8}$	2	No. 2.
$\frac{9}{16}$	$\frac{9}{16}$	$\frac{5}{16}$	2.80	9	$5\frac{1}{8}$	2	
$\frac{5}{8}$	$\frac{5}{8}$	$\frac{1}{2}$	2.90	10	$6\frac{1}{8}$	2	
$\frac{11}{16}$	$\frac{11}{16}$	$\frac{3}{8}$	3.00	$11\frac{3}{4}$	$7\frac{1}{8}$	3	
$\frac{3}{4}$	$\frac{3}{4}$	$\frac{7}{16}$	3.10	12	$7\frac{3}{8}$	3	No. 3.
$\frac{13}{16}$	$\frac{13}{16}$	$\frac{1}{2}$	3.30	12	$7\frac{3}{8}$	3	
$\frac{7}{8}$	$\frac{7}{8}$	$\frac{9}{16}$	3.50	12	$7\frac{3}{8}$	3	
$\frac{15}{16}$	$\frac{15}{16}$	$\frac{5}{8}$	3.70	12	$7\frac{3}{8}$	3	
1	1	$\frac{11}{16}$	3.90	12	$7\frac{3}{8}$	3	No. 4.
$1\frac{1}{16}$	$1\frac{1}{16}$	$\frac{3}{4}$	4.00	12	$7\frac{3}{8}$	3	
$1\frac{1}{8}$	$1\frac{1}{8}$	$\frac{13}{16}$	4.30	12	$7\frac{3}{8}$	3	
$1\frac{3}{16}$	$1\frac{3}{16}$	$\frac{7}{8}$	4.60	12	$7\frac{3}{8}$	3	
$1\frac{1}{4}$	$1\frac{1}{4}$	$\frac{15}{16}$	4.90	13	$7\frac{3}{8}$	3	
$1\frac{5}{8}$	$1\frac{5}{8}$	1	5.20	13	$7\frac{3}{8}$	3	
$1\frac{3}{4}$	$1\frac{3}{4}$	$1\frac{1}{16}$	5.60	13	$7\frac{3}{8}$	3	
$1\frac{7}{8}$	$1\frac{7}{8}$	$1\frac{1}{8}$	6.00	13	$7\frac{3}{8}$	3	
$1\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{3}{8}$	6.40	13	$7\frac{3}{8}$	3	

These Reamers are designed for hard and rough work and are not ground closely to size. These Reamers from  $\frac{1}{4}$  inch to  $\frac{5}{8}$  inch inclusive have 4 flutes; from  $\frac{11}{16}$  inch to  $1\frac{1}{4}$  inches inclusive have 5 flutes; from  $1\frac{1}{8}$  inches to  $1\frac{1}{2}$  inches inclusive have 6 flutes.

For Reamers designed for use in cases where a smooth, accurate hole is required see 120 C and 120½ C pages 198-199.

## No. 120 S.

## STRAIGHT REAMERS WITH TAPER END

FOR BOILER MAKERS, BRIDGE AND SHIP BUILDERS.



Diameter Inches at A B C			Price Each.	Whole Length, Inches.	Length Flutes, Inches.	Length of Taper B to C Inches.
$\frac{1}{4}$	$\frac{1}{4}$	$\frac{3}{16}$	\$2.75	$4\frac{1}{4}$	$3\frac{3}{8}$	1
$\frac{5}{16}$	$\frac{5}{16}$	$\frac{1}{4}$	2.75	$4\frac{3}{4}$	$3\frac{3}{4}$	1
$\frac{3}{8}$	$\frac{3}{8}$	$\frac{5}{16}$	2.75	$5\frac{1}{2}$	4	1
$\frac{7}{16}$	$\frac{7}{16}$	$\frac{3}{8}$	2.75	$6\frac{1}{2}$	$4\frac{3}{8}$	1
$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{4}$	2.75	$8\frac{1}{8}$	$5\frac{3}{8}$	2
$\frac{9}{16}$	$\frac{9}{16}$	$\frac{1}{2}$	2.80	$8\frac{7}{8}$	$5\frac{3}{8}$	2
$\frac{5}{8}$	$\frac{5}{8}$	$\frac{3}{2}$	2.90	$9\frac{1}{8}$	$6\frac{1}{8}$	2
$\frac{11}{16}$	$\frac{11}{16}$	$\frac{3}{8}$	3.00	$10\frac{1}{8}$	$7\frac{1}{8}$	3
$\frac{3}{4}$	$\frac{3}{4}$	$\frac{7}{16}$	3.10	$10\frac{1}{2}$	$7\frac{3}{8}$	3
$\frac{13}{16}$	$\frac{13}{16}$	$\frac{1}{2}$	3.30	$10\frac{1}{2}$	$7\frac{3}{8}$	3
$\frac{7}{8}$	$\frac{7}{8}$	$\frac{9}{16}$	3.50	$10\frac{5}{8}$	$7\frac{3}{8}$	3
$\frac{15}{16}$	$\frac{15}{16}$	$\frac{5}{8}$	3.70	$10\frac{5}{8}$	$7\frac{3}{8}$	3
1	1	$\frac{11}{16}$	3.90	$10\frac{5}{8}$	$7\frac{3}{8}$	3
$1\frac{1}{16}$	$1\frac{1}{16}$	$\frac{3}{4}$	4.00	$10\frac{5}{8}$	$7\frac{3}{8}$	3
$1\frac{1}{8}$	$1\frac{1}{8}$	$\frac{13}{16}$	4.30	$10\frac{5}{8}$	$7\frac{3}{8}$	3
$1\frac{3}{16}$	$1\frac{3}{16}$	$\frac{7}{8}$	4.60	$10\frac{5}{8}$	$7\frac{3}{8}$	3
$1\frac{1}{4}$	$1\frac{1}{4}$	$\frac{15}{16}$	4.90	$10\frac{5}{8}$	$7\frac{3}{8}$	3
$1\frac{5}{16}$	$1\frac{5}{16}$	1	5.20	$10\frac{5}{8}$	$7\frac{3}{8}$	3
$1\frac{3}{8}$	$1\frac{3}{8}$	$1\frac{1}{16}$	5.60	$10\frac{5}{8}$	$7\frac{3}{8}$	3
$1\frac{7}{16}$	$1\frac{7}{16}$	$1\frac{1}{8}$	6.00	$10\frac{5}{8}$	$7\frac{3}{8}$	3
$1\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{3}{16}$	6.40	$10\frac{5}{8}$	$7\frac{3}{8}$	3

These Reamers are designed for hard and rough work and are not ground closely to size. These Reamers from  $\frac{1}{4}$  inch to  $\frac{5}{8}$  inch inclusive have 4 flutes; from  $\frac{11}{16}$  inch to  $1\frac{1}{4}$  inches inclusive have 5 flutes; from  $1\frac{1}{8}$  inches to  $1\frac{1}{2}$  inches inclusive have 6 flutes.

For Reamers designed for use in cases where a smooth, accurate hole is required see 120 C and 120 $\frac{1}{2}$  C pages 198-199.

## No. 120 T.

### ADJUSTABLE REAMERS.



Have an adjustment of from  $\frac{1}{32}$  under size to  $\frac{1}{32}$  over size in sizes  $\frac{7}{8}$  to 3 inches inclusive and from  $\frac{1}{16}$  under size to  $\frac{1}{16}$  over size in sizes  $3\frac{1}{8}$  to 4 inches inclusive.

Diameter, Inches.	Price Each.	Whole Length, Inches.	Diameter, Inches.	Price Each.	Whole Length, Inches.
$\frac{7}{8}$	\$4.50	$6\frac{1}{8}$	$2\frac{3}{16}$	\$10.50	$13\frac{3}{8}$
$\frac{1}{8}$	4.75	$7\frac{1}{8}$	$2\frac{1}{4}$	10.80	$13\frac{1}{8}$
1	5.00	$7\frac{7}{16}$	$2\frac{5}{16}$	11.10	14
$1\frac{1}{16}$	5.25	$7\frac{3}{4}$	$2\frac{3}{8}$	11.40	$14\frac{5}{16}$
$1\frac{1}{8}$	5.50	$8\frac{1}{16}$	$2\frac{7}{16}$	11.70	$14\frac{5}{8}$
$1\frac{3}{16}$	5.75	$8\frac{3}{8}$	$2\frac{1}{2}$	12.00	$14\frac{1}{2}$
$1\frac{1}{4}$	6.00	$8\frac{1}{2}$	$2\frac{9}{16}$	12.30	$15\frac{1}{4}$
$1\frac{5}{16}$	6.30	9	$2\frac{5}{8}$	12.60	$15\frac{3}{8}$
$1\frac{3}{8}$	6.60	$9\frac{5}{16}$	$2\frac{1}{2}$	12.90	$15\frac{7}{8}$
$1\frac{7}{16}$	6.90	$9\frac{5}{8}$	$2\frac{3}{4}$	13.20	$16\frac{3}{16}$
$1\frac{1}{2}$	7.20	$9\frac{1}{2}$	$2\frac{1}{2}$	13.70	$16\frac{1}{2}$
$1\frac{9}{16}$	7.50	$10\frac{1}{4}$	$2\frac{7}{8}$	14.20	$16\frac{1}{2}$
$1\frac{5}{8}$	7.80	$10\frac{9}{16}$	$2\frac{1}{2}$	14.70	$17\frac{1}{8}$
$1\frac{1}{2}$	8.10	$10\frac{7}{8}$	3	15.20	$17\frac{7}{8}$
$1\frac{3}{4}$	8.40	$11\frac{3}{16}$	$3\frac{1}{8}$	16.20	$17\frac{3}{4}$
$1\frac{7}{8}$	8.70	$11\frac{1}{2}$	$3\frac{1}{4}$	17.20	$18\frac{1}{16}$
$1\frac{7}{8}$	9.00	$11\frac{1}{2}$	$3\frac{3}{8}$	18.20	$18\frac{3}{8}$
$1\frac{1}{2}$	9.30	$12\frac{1}{8}$	$3\frac{1}{2}$	19.20	$18\frac{1}{2}$
2	9.60	$12\frac{7}{16}$	$3\frac{5}{8}$	20.20	19
$2\frac{1}{16}$	9.90	$12\frac{3}{4}$	$3\frac{3}{4}$	21.20	$19\frac{5}{16}$
$2\frac{1}{8}$	10.20	$13\frac{1}{16}$	$3\frac{7}{8}$	22.20	$19\frac{5}{8}$
			4	23.20	$19\frac{1}{2}$

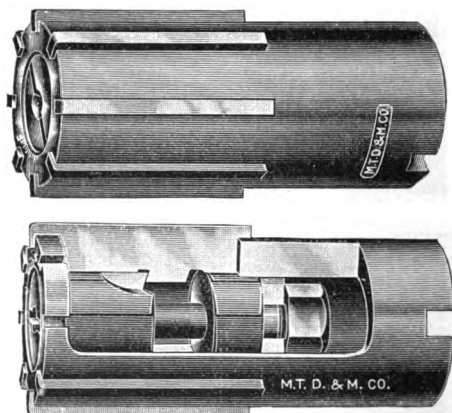
This Reamer is new and simple in design, strongly made and has but few parts. It is very easily adjusted, and by its use holes can be reamed to the bottom.

The blades are seated in slots milled in the body and thus remain concentric when adjustment is made. A graduated collar indicates the adjustment in thousandths of one inch.

If Reamer is being used in a machine it can be adjusted either smaller or larger without its being removed.

## No. 500.

## ONE-LOCK ADJUSTABLE REAMERS.



BLADES FURNISHED ONLY IN SETS.

Diam., Inches.	Price Each.	Extra Blades Per Set.	Diam., Inches.	Price Each.	Extra Blades Per Set.	Diam., Inches.	Price Each.	Extra Blades Per Set.
$\frac{3}{4}$	\$6.00	\$2.80	$1\frac{1}{8}$	\$7.50	\$3.05	$2\frac{3}{8}$	\$11.40	\$4.20
$\frac{13}{16}$	6.00	2.80	$1\frac{5}{8}$	7.80	3.10	$2\frac{7}{8}$	11.70	4.30
$\frac{7}{8}$	6.00	2.80	$1\frac{11}{16}$	8.10	3.15	$2\frac{1}{2}$	12.00	4.40
$\frac{15}{16}$	6.00	2.80	$1\frac{3}{4}$	8.40	3.20	$2\frac{9}{16}$	12.30	4.50
1	6.00	2.80	$1\frac{13}{16}$	8.70	3.30	$2\frac{5}{8}$	12.60	4.60
$1\frac{1}{16}$	6.00	2.80	$1\frac{7}{8}$	9.00	3.40	$2\frac{11}{16}$	12.90	4.70
$1\frac{1}{8}$	6.00	2.80	$1\frac{15}{16}$	9.30	3.50	$2\frac{3}{4}$	13.20	4.80
$1\frac{3}{8}$	6.00	2.80	2	9.60	3.60	$2\frac{13}{16}$	13.70	4.90
$1\frac{1}{4}$	6.00	2.80	$2\frac{1}{8}$	9.90	3.70	$2\frac{7}{8}$	14.20	5.00
$1\frac{5}{8}$	6.30	2.85	$2\frac{1}{4}$	10.20	3.80	$2\frac{15}{16}$	14.70	5.10
$1\frac{3}{4}$	6.60	2.90	$2\frac{3}{8}$	10.50	3.90	3	15.20	5.20
$1\frac{7}{8}$	6.90	2.95	$2\frac{1}{2}$	10.80	4.00			
$1\frac{1}{2}$	7.20	3.00	$2\frac{5}{8}$	11.10	4.10			

An Adjustment Socket Wrench and a Key are furnished without charge with each Reamer.

Turning the Cam Bolt in the Shell by the slotted head moves all blades at once and all exactly alike, outward from the centre. When the desired diameter is reached *be sure all blades are firmly seated on Cam Bolt* before the Lock Nut is tightened.

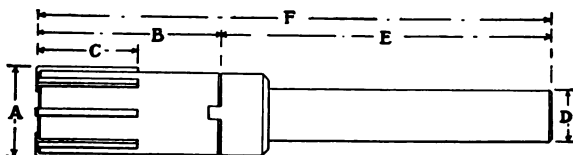
Nothing to get out of order. Only three parts besides blades. One movement operates all blades at once. One nut locks them.

Exact adjustment is quickly made to any size within range without regrinding blades. See page 243.

## No. 125P.

## ARBORS FOR ONE-LOCK REAMERS.

Number.	Straight Shank. Price Each.	Morse Taper Shank. Price Each.	Fitting Sizes, Inches.	Diam. of Straight Shank, Inches.	Morse Taper Shank Number.
1	\$1.00	\$2.50	$\frac{3}{4}$ to $1\frac{1}{8}$	$\frac{5}{8}$	2
2	1.25	3.00	1 to $1\frac{3}{16}$	$\frac{3}{4}$	3
3	1.50	3.50	$1\frac{1}{4}$ to $1\frac{1}{2}$	$\frac{7}{8}$	3
4	2.00	4.50	$1\frac{3}{4}$ to $2\frac{3}{16}$	$1\frac{1}{8}$	4
5	3.00	5.00	$2\frac{1}{4}$ to $2\frac{1}{2}$	$1\frac{3}{8}$	4
6	4.00	7.00	$2\frac{3}{4}$ to 3	$1\frac{3}{4}$	5



## DIMENSIONS OF ONE-LOCK REAMER PARTS.

A. Diameter of Reamer, Inches.	B. Length of Reamer, Inches.	C. Length of Blade, Inches.	D. Diameter of Arbor, Inches.	E. Length Straight or Morse Taper Arbor, Inches.	F. Whole Length Reamer and Arbor, Inches.
$\frac{3}{4}$ to $1\frac{1}{8}$	$2\frac{1}{8}$	$1\frac{1}{8}$	$\frac{5}{8}$	$6\frac{5}{8}$	$9\frac{7}{16}$
1 to $1\frac{3}{16}$	$3\frac{1}{8}$	$1\frac{3}{8}$	$\frac{3}{4}$	$7\frac{1}{2}$	$10\frac{9}{16}$
$1\frac{1}{4}$ to $1\frac{1}{2}$	$3\frac{1}{4}$	$1\frac{1}{2}$	$\frac{7}{8}$	$7\frac{7}{8}$	$11\frac{3}{8}$
$1\frac{3}{4}$ to $2\frac{3}{16}$	$4\frac{1}{8}$	$2\frac{3}{8}$	$1\frac{1}{8}$	$8\frac{1}{4}$	$12\frac{1}{2}$
$2\frac{1}{4}$ to $2\frac{1}{2}$	$4\frac{1}{4}$	$2\frac{5}{8}$	$1\frac{3}{8}$	$8\frac{3}{4}$	$13\frac{1}{4}$
$2\frac{3}{4}$ to 3	$5\frac{3}{16}$	3	$1\frac{3}{4}$	$9\frac{1}{4}$	$14\frac{1}{8}$

One-Lock Reamers  $\frac{3}{4}$  to  $1\frac{1}{8}$  inch diameter will adjust  $\frac{1}{16}$  inch; 1 to  $1\frac{3}{16}$  inches adjust .025 inch;  $1\frac{1}{4}$  to  $1\frac{1}{2}$  inches adjust  $\frac{1}{32}$  inch;  $1\frac{3}{4}$  to  $1\frac{1}{2}$  inches adjust  $\frac{1}{16}$  inch; 2 to  $2\frac{1}{2}$  inches adjust  $\frac{1}{8}$  inch;  $2\frac{3}{4}$  to 3 inches adjust  $\frac{1}{4}$  inch.

The One-Lock Reamer can be adjusted larger or smaller with equal facility. The blades have no endwise movement in the shell, and can always ream to the bottom of a blind hole.

In ordering blades, state size of Reamer and also length of shell.  
Send for special circular.

### No. 109 A. THREE-GROOVE BIT STOCK COUNTERSINKS.



Included angle of cutting point is 82°. Countersinks with other angles made to order at special prices.

Diameter, Inches.	Price Each.	Whole Length, Inches.	Diameter, Inches.	Price Each.	Whole Length, Inches.
$\frac{3}{8}$	\$ .50	$4\frac{1}{4}$	$\frac{3}{4}$	\$ .90	5
$\frac{1}{2}$	.60	$4\frac{1}{4}$	$\frac{7}{8}$	1.05	5
$\frac{5}{8}$	.75	$4\frac{1}{4}$	1	1.20	5

### No. 109 B. COMBINED DRILLS AND COUNTERSINKS.



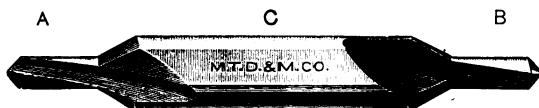
Included Angle, 60°. Other angles made to order at special prices.

Size Number.	Diameter of Drill at A B	Approximate Fractional Equivalents.	Price Per Dozen.	Diameter of Body, C Inches.	Decimal Equivalents. A B
1	No. 57 x No. 57	$\frac{3}{64}$	\$1.50	$\frac{1}{8}$	.043 x .043
2	No. 55 x No. 55		1.50	$\frac{1}{4}$	.052 x .052
3	No. 52 x No. 52	$\frac{1}{16}$	1.50	$\frac{1}{4}$	.063 x .063
4	No. 49 x No. 49		1.50	$\frac{15}{64}$	.073 x .073
5	No. 49 x No. 45		1.50	$\frac{15}{64}$	.073 x .082
6	No. 46 x No. 46	$\frac{5}{64}$	1.50	$\frac{15}{64}$	.081 x .081
7	No. 42 x No. 42	$\frac{3}{32}$	1.50	$\frac{3}{16}$	.093 x .093
8	No. 42 x No. 30	$\frac{3}{32}$ x $\frac{1}{8}$	1.50	$\frac{3}{16}$	.093 x .123
9	No. 30 x No. 30	$\frac{1}{8}$	1.50	$\frac{3}{16}$	.128 x .128
10	No. 22 x No. 22	$\frac{5}{32}$	3.00	$\frac{7}{16}$	.157 x .157
11	No. 13 x No. 13	$\frac{3}{16}$	3.00	$\frac{7}{16}$	.185 x .185
12	.07 x .08		1.50	$\frac{15}{64}$	.07 x .08
13	$\frac{3}{64}$ x $\frac{3}{64}$		1.50	$\frac{3}{16}$	.046 x .046
14	$\frac{1}{16}$ x No. 45		1.50	$\frac{15}{64}$	.062 x .082
15	$\frac{3}{16}$ x $\frac{5}{32}$		3.00	$\frac{7}{16}$	.187 x .156

**No. 109½ B.****COMBINED DRILLS AND COUNTERSINKS**

FOR DRILLING AND COUNTERSINKING

TIRES AND WAGON IRONS.



Size Number.	Diameter of Drill at A B		Price Per Dozen.	Diameter of Body, C Inches.
1	$\frac{7}{32}$	x $\frac{7}{32}$	\$4.60	$\frac{1}{2}$
2	$\frac{7}{32}$	x $\frac{9}{32}$	4.60	$\frac{1}{2}$
3	$\frac{9}{32}$	x $\frac{9}{32}$	4.60	$\frac{1}{2}$
4	$\frac{11}{32}$	x $\frac{11}{32}$	5.00	$\frac{1}{2}$
5	$\frac{11}{32}$	x $\frac{13}{32}$	5.00	$\frac{1}{2}$
6	$\frac{13}{32}$	x $\frac{13}{32}$	5.00	$\frac{1}{2}$
7	$\frac{7}{32}$	x $\frac{7}{32}$	7.25	$\frac{5}{8}$
8	$\frac{7}{32}$	x $\frac{9}{32}$	7.25	$\frac{5}{8}$
9	$\frac{9}{32}$	x $\frac{9}{32}$	7.25	$\frac{5}{8}$
10	$\frac{11}{32}$	x $\frac{11}{32}$	7.75	$\frac{5}{8}$
11	$\frac{11}{32}$	x $\frac{13}{32}$	7.75	$\frac{5}{8}$
12	$\frac{13}{32}$	x $\frac{13}{32}$	7.75	$\frac{5}{8}$

**No. 109 C.****COMBINED DRILLS AND COUNTERSINKS.**

WITH NO. 1 MORSE TAPER SHANKS.



Size Number.	Diameter of Drill, Inches.	Price Each.	Diameter of Body, Inches.
1	$\frac{1}{16}$	\$ .75	$\frac{7}{16}$
2	$\frac{3}{32}$	.75	$\frac{7}{16}$
3	$\frac{1}{8}$	.75	$\frac{7}{16}$
4	$\frac{5}{32}$	.75	$\frac{7}{16}$
5	$\frac{3}{16}$	.75	$\frac{7}{16}$

## No. 109 D. TAPER SHANK COUNTERBORES.



The Counterbores are furnished to the diameters of the heads of screws and the Guides to the body size.

These Counterbores can be furnished with straight shanks at special prices.

### PRICE OF COUNTERBORE COMPLETE.

Diameter Counterbore, Inches.	Diameter Guide, Inches.	Price Each.	Whole Length, Inches.	Morse Taper Shank
$\frac{3}{8}$	$\frac{1}{4}$	\$1.40	$4\frac{9}{16}$	No. 1.
$\frac{7}{16}$	$\frac{5}{16}$	1.40	$4\frac{9}{16}$	
$\frac{1}{2}$	$\frac{3}{8}$	1.40	$4\frac{13}{16}$	
$\frac{9}{16}$	$\frac{3}{8}$	1.40	$4\frac{13}{16}$	
$\frac{5}{8}$	$\frac{7}{16}$	1.40	$4\frac{13}{16}$	
$\frac{11}{16}$	$\frac{7}{16}$	1.50	$5\frac{3}{16}$	
$\frac{3}{4}$	$\frac{1}{2}$	1.50	$5\frac{3}{16}$	
$\frac{13}{16}$	$\frac{1}{2}$	1.50	$5\frac{3}{16}$	
$\frac{7}{8}$	$\frac{9}{16}$	1.80	$6\frac{1}{16}$	
$\frac{15}{16}$	$\frac{5}{8}$	1.80	$6\frac{1}{16}$	
1	$\frac{3}{4}$	1.80	$6\frac{1}{16}$	No. 2.
$1\frac{1}{16}$	$\frac{3}{4}$	1.80	$6\frac{5}{16}$	
$1\frac{1}{8}$	$\frac{13}{16}$	2.00	$6\frac{5}{16}$	
$1\frac{1}{4}$	$\frac{13}{16}$	2.00	$6\frac{5}{16}$	
$1\frac{3}{8}$	$\frac{7}{8}$	2.20	$7\frac{1}{16}$	
$1\frac{1}{2}$	1	2.80	$7\frac{1}{16}$	
$1\frac{5}{8}$	$\frac{7}{8}$	2.40	$7\frac{1}{16}$	No. 3.
$1\frac{3}{4}$	$\frac{15}{16}$	2.60	$7\frac{1}{16}$	
$1\frac{7}{8}$	$\frac{15}{16}$	2.80	$7\frac{1}{16}$	

## No. 109 J. COUNTERBORES AND COUNTERSINKS. FOR MACHINE SCREW HEADS.



The above are made with Taper or Straight Shanks, and to order only. When ordering state whether with Taper or Straight Shank, and whether for Filister, Round or Flat Head. As there is no recognized standard for diameter of machine screws it will be necessary to give the diameter of both counterbore and guide.

Countersinks for Flat Heads are made with included angle of eighty-two degrees (82°), and without guide, and each will apply to several sizes of heads. Will be furnished with guides if so ordered.

The included angle for Wood Screws, Machine Screws and Stove Bolts is 82 degrees, Tire Bolts 54 degrees, and Sleigh Shoe Bolts 30 degrees.

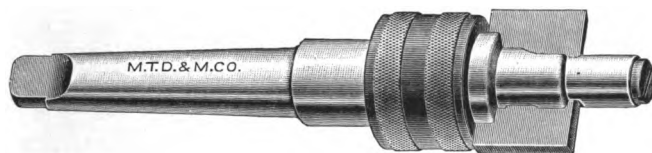
For Sets of Counterbores, Taps, Tap Drills and Wrench, for Screws to A. S. M. E. Standard see pages 250 and 252.

For No. 109 E see pages 73-74.



**No. 109 F.**

**COUNTERBORES**  
**WITH INTERCHANGEABLE BLADES AND GUIDES**  
**AND MORSE TAPER SHANKS.**



Size Number.	Price Each.		Capacity.		Morse Taper Shank Number.
	Without Blade and Guide.	With One Blade and One Guide See Lists Below.	Blades Inches.	Guides Inches.	
1	\$3.50	\$5.00	$\frac{3}{4}$ to $1\frac{1}{2}$	$\frac{1}{2}$ to 1	2
2	4.55	6.25	$1\frac{1}{8}$ to $2\frac{1}{2}$	$\frac{7}{8}$ to $1\frac{1}{4}$	3
3	5.60	8.00	$2\frac{1}{8}$ to $3\frac{1}{2}$	$1\frac{1}{8}$ to 2	4

**BLADES****Price Each**

$\frac{3}{4}$ to 1 inch by 16ths	.	.	.	.	.	.	.	\$ .75
$1\frac{1}{8}$ to $1\frac{1}{2}$ inches by 16ths	.	.	.	.	.	.	.	.85
$1\frac{3}{8}$ to 2 inches by 16ths	.	.	.	.	.	.	.	.95
$2\frac{1}{8}$ to $2\frac{1}{2}$ inches by 16ths	.	.	.	.	.	.	.	1.25
$2\frac{3}{8}$ to 3 inches by 16ths	.	.	.	.	.	.	.	1.65
$3\frac{1}{8}$ to $3\frac{1}{2}$ inches by 16ths	.	.	.	.	.	.	.	1.85

**GUIDES****Price Each**

$\frac{1}{2}$ to 1 inch by 16ths	.	.	.	.	.	.	.	\$ .75
$1\frac{1}{8}$ to $1\frac{3}{8}$ inches by 16ths	.	.	.	.	.	.	.	.75
$1\frac{5}{8}$ to 2 inches by 16ths	.	.	.	.	.	.	.	.85

Special sizes made to order. Prices quoted on application.

## No 109 K. COUNTERBORES

### WITH MORSE TAPER SHANKS.

Counterbores given in the table below are furnished either singly or in sets. A set consists of one counterbore for head of screw with guide of body size, one counterbore for head with guide of tap drill size, and one counterbore to enlarge a tap drill hole to body size. Counterbores of other sizes are made to order at special prices.



Diameter of Screw and Pitch U. S. Standard.	Price Each.	Diameter of Counterbore, Inches.		Diameter of Guide, Inches.		Whole Length, Inches.	Morse Taper Shank.
		For Head of Screw.	For Body of Screw	For Body Size Hole.	For Tap Drill Hole		
1/4 20	\$1.50	3/8		1/4		5 3/4	No. 1.
1/4 20	1.50	3/8			.1865	5 3/4	
1/4 20	1.50		1/4		.1865	5 3/4	
1/8 18	1.50	7/16		1/8		6 1/8	
1/8 18	1.50	7/16			.241	6 1/8	
1/8 18	1.50		1/8		.241	6 1/8	
3/8 16	1.50	9/16		3/8		6 1/2	
3/8 16	1.50	9/16			.301	6 1/2	
3/8 16	1.50		3/8		.301	6 1/2	
1/2 14	1.60	5/8		1/2		7	
1/2 14	1.60	5/8			.347	7	
1/2 14	1.60		1/2		.347	7	
1/2 13	1.60	3/4		1/2		7 1/4	No. 2.
1/2 13	1.60	3/4			.4057	7 1/4	
1/2 13	1.60		1/2		.4057	7 1/4	
1/2 12	1.75	11/16		1/2		7 1/2	
1/2 12	1.75	11/16			.452	7 1/2	
1/2 12	1.75		1/2		.452	7 1/2	
5/8 11	2.00	7/8		5/8		7 3/4	
5/8 11	2.00	7/8			.5146	7 3/4	
5/8 11	2.00		5/8		.5146	7 3/4	
1 11	2.10	1 1/16		1		8 1/2	
1 11	2.10	1 1/16			.5771	8 1/2	
1 11	2.10		1		.5771	8 1/2	
3/4 10	2.20	1		3/4		9	No. 3.
3/4 10	2.20	1			.624	9	
3/4 10	2.20		3/4		.624	9	
1 10	2.30	1 1/16		1		9	
1 10	2.30	1 1/16			.6865	9	
1 10	2.30		1		.6865	9	
7/8 9	2.40	1 1/8		7/8		9 1/4	
7/8 9	2.40	1 1/8			.7333	9 1/4	
7/8 9	2.40		7/8		.7333	9 1/4	
1 9	2.40	1 3/16		1		9 1/4	
1 9	2.40	1 3/16			.7958	9 1/4	
1 9	2.40		1		.7958	9 1/4	
1 8	2.60	1 1/4		1		9 1/2	No. 4.
1 8	2.60	1 1/4			.8427	9 1/2	
1 8	2.60		1		.8427	9 1/2	

For sets of Counterbores, Taps, Tap Drills and Wrench in Blocks see page 249.

## No. 109 L. COUNTERBORES

### WITH STRAIGHT SHANKS.

Counterbores given in the table below are furnished either singly or in sets. A set consists of one counterbore for head of screw with guide of body size, one counterbore for head with guide of tap drill size, and one counterbore to enlarge a tap drill hole to body size. Counterbores of other sizes are made to order at special prices.



Diameter of Screw, and Pitch U. S. Standard.	Price Each.	Diameter of Counterbore, Inches.		Diameter of Guide, Inches.		Whole Length, Inches.	Shank.	
		For Head of Screw.	For Body of Screw.	For Body Size Hole	For Tap Drill Hole		Length, Inches.	Diam., Inches.
1/4 20	\$1.50	3/8		1/4		5 3/4	2 9/16	1/2
1/4 20	1.50	3/8			.1865	5 3/4	2 9/16	1/2
1/4 20	1.50		1/4		.1865	5 3/4	2 9/16	1/2
5/16 18	1.50	7/16		5/16		6 1/8	2 9/16	1/2
5/16 18	1.50	7/16			.241	6 1/8	2 9/16	1/2
5/16 18	1.50		5/16		.241	6 1/8	2 9/16	1/2
3/8 16	1.50	9/16		3/8		6 1/2	2 9/16	1/2
3/8 16	1.50	9/16			.301	6 1/2	2 9/16	1/2
3/8 16	1.50		3/8		.301	6 1/2	2 9/16	1/2
7/16 14	1.60	5/8		7/16		7	3 7/8	11/16
7/16 14	1.60	5/8			.347	7	3 7/8	11/16
7/16 14	1.60		7/16		.347	7	3 7/8	11/16
1/2 13	1.60	3/4		1/2		7 1/4	3 7/8	11/16
1/2 13	1.60	3/4			.4057	7 1/4	3 7/8	11/16
1/2 13	1.60		1/2		.4057	7 1/4	3 7/8	11/16
9/16 12	1.75	13/16		9/16		7 1/2	3 7/8	11/16
9/16 12	1.75	13/16			.452	7 1/2	3 7/8	11/16
9/16 12	1.75		9/16		.452	7 1/2	3 7/8	11/16
5/8 11	2.00	7/8		5/8		7 3/4	3 7/8	11/16
5/8 11	2.00	7/8			.5146	7 3/4	3 7/8	11/16
5/8 11	2.00		5/8		.5146	7 3/4	3 7/8	11/16
11/16 11	2.10	15/16		11/16		8 1/2	3 7/8	15/16
11/16 11	2.10	15/16			.5771	8 1/2	3 7/8	15/16
11/16 11	2.10		11/16		.5771	8 1/2	3 7/8	15/16
3/4 10	2.20	1		3/4		9	3 7/8	15/16
3/4 10	2.20	1			.624	9	3 7/8	15/16
3/4 10	2.20		3/4		.624	9	3 7/8	15/16
13/16 10	2.30	1 1/16		13/16		9	3 7/8	1
13/16 10	2.30	1 1/16			.6865	9	3 7/8	1
13/16 10	2.30		13/16		.6865	9	3 7/8	1
7/8 9	2.40	1 1/8		7/8		9 1/4	3 7/8	1
7/8 9	2.40	1 1/8			.7333	9 1/4	3 7/8	1
7/8 9	2.40		7/8		.7333	9 1/4	3 7/8	1
15/16 9	2.40	1 3/16		15/16		9 1/4	3 7/8	1
15/16 9	2.40	1 3/16			.7958	9 1/4	3 7/8	1
15/16 9	2.40		15/16		.7958	9 1/4	3 7/8	1
1 8	2.60	1 1/4		1		9 1/2	3 7/8	1
1 8	2.60	1 1/4			.8427	9 1/2	3 7/8	1
1 8	2.60		1		.8427	9 1/2	3 7/8	1

For sets of Counterbores, Taps, Tap Drills and Wrench in Blocks see pages 250-252.

## SCREW SETS IN BLOCKS.

U. S. STANDARD

AND

A. S. M. E. STANDARD.



These sets illustrated above are listed on pages 251-252.

They are carried in stock for U. S. Standard screws and machine screws to the A. S. M. E. Standard only. Each set complete with Drills, Taps, Counterbores and Wrench as listed.

# SCREW SETS IN BLOCKS

## FOR

### U. S. STANDARD SCREWS.

Diameter and Pitch of Screw.	Price Per Set.	Taper Shank Drills.		TAPER SHANK COUNTERBORES.								Taps.	Wrench
		Tap Size.	Body Size.	Tap Size For Body.		Tap Size For Fil. Head.		Body Size For Fil. Head.		Body Size Seat Hex. Head.			
				Dia. Guide.	Dia. Bore.	Dia. Guide.	Dia. Bore.	Dia. Guide.	Dia. Bore.	Dia. Guide.	Dia. Bore.		
*1/4 20	\$21.60	3/16	1/4	3/16	1/4	3/16	3/8	1/4	3/8	1/4	5/8	1/4 20	4
1/8 18	19.50	C	5/16	C	5/16	C	7/16	5/16	7/16	5/16	1 1/8	5/16 18	5
3/8 16	20.60	N	3/8	N	3/8	N	1/2	3/8	1/2	3/8	1 1/8	3/8 16	6
1/2 14	22.50	S	1/2	S	1/2	S	5/8	1/2	5/8	1/2	1 1/8	1/2 14	7
1/2 13	23.10	3/16	1/2	3/16	1/2	3/16	3/4	1/2	3/4	1/2	1 1/8	1/2 13	7
1/2 12	23.10	3/16	1/2	3/16	1/2	3/16	3/4	1/2	3/4	1/2	1 1/8	1/2 12	7
5/8 12	24.75	3/16	5/8	3/16	5/8	3/16	1 1/8	5/8	1 1/8	5/8	1 1/4	5/8 12	8
5/8 11	27.30	3/16	5/8	3/16	5/8	3/16	1 1/8	5/8	1 1/8	5/8	1 1/4	5/8 11	8
3/4 10	31.00	5/8	3/4	5/8	3/4	5/8	1 1/8	3/4	1 1/8	3/4	1 1/2	3/4 10	9
7/8 9	40.25	1	7/8	1	7/8	1	1 1/4	7/8	1 1/4	1	1 1/2	7/8 9	10
1 8	51.25	3/4	1	3/4	1	3/4	1 1/4	1	1 1/4	1	1 1/2	1 8	12

\*For 1/4 20 Set only, there is furnished in addition to the counterbores listed, one for flat head screws: Diameter of Guide 1/4, Diameter of Bore 3/8. Price on this size only includes five Counterbores.

# SCREW SETS IN BLOCKS

FOR

## MACHINE SCREWS A. S. M. E. STANDARD.

Number and Pitch of Screw.	Price Per Set.	Straight Shank Drills.		STRAIGHT SHANK COUNTERBORES.												Tap Pitch.	No.
		Tap Size.	Body Size.	Tap Size For Body.		Tap Size For Fl. Head.		Body Size For Fl. Head.		Body Size For Round Head.		Body Size For Flat Head.					
				Dia. Guide.	Dia. Bore.	Dia. Guide.	Dia. Bore.	Dia. Guide.	Dia. Bore.	Dia. Guide.	Dia. Bore.						
												Dia. Guide.	Dia. Bore.	Dia. Guide.	Dia. Bore.		
0-80	\$21.00	No. 56	$\frac{1}{8}$	.046	.0625	.046	.090	.062	.090	.062	.136	.062	.136	0-80	1		
1-72	21.00	No. 53	$\frac{1}{8}$	.059	.073	.059	.112	.073	.112	.073	.160	.073	.160	1-72	1		
2-64	21.00	No. 50	$\frac{1}{8}$	.070	.086	.070	.134	.086	.134	.086	.184	.086	.184	2-64	1		
3-56	21.00	No. 47	$\frac{1}{8}$	.078	.0995	.078	.155	.099	.155	.099	.208	.099	.208	3-56	1		
4-48	21.00	No. 43	$\frac{1}{8}$	.089	.113	.089	.176	.113	.176	.113	.232	.113	.232	4-48	1		
5-44	21.50	No. 39	$\frac{1}{8}$	.099	.125	.099	.198	.125	.198	.125	.256	.125	.256	5-44	2		
6-40	21.50	No. 35	$\frac{1}{8}$	.110	.140	.110	.219	.140	.219	.140	.280	.140	.280	6-40	2		
7-36	21.50	No. 31	$\frac{1}{8}$	.120	.152	.120	.240	.152	.240	.152	.304	.152	.304	7-36	2		
8-36	21.50	No. 29	$\frac{1}{8}$	.136	.166	.136	.262	.166	.262	.166	.328	.166	.328	8-36	3		
9-32	21.50	No. 28	$\frac{1}{8}$	.140	.177	.140	.284	.177	.284	.177	.352	.177	.352	9-32	3		
10-30	21.50	No. 24	$\frac{1}{8}$	.152	.191	.152	.305	.191	.305	.191	.376	.191	.376	10-30	3		
12-28	22.00	No. 17	$\frac{7}{16}$	.173	.2187	.173	.348	.218	.348	.218	.424	.218	.424	12-28	4		
14-24	22.00	No. 10	$\frac{1}{2}$	.193	.242	.193	.390	.242	.390	.242	.473	.242	.473	14-24	4		
16-22	22.00	No. 3	$\frac{1}{2}$	.213	.272	.213	.433	.272	.433	.272	.521	.272	.521	16-22	4		
18-20	22.00	A	M	.234	.295	.234	.476	.295	.476	.295	.569	.295	.569	18-20	5		
20-20	22.75	G	P	.261	.323	.261	.518	.323	.518	.323	.617	.323	.617	20-20	5		
22-18	23.35	K	S	.281	.348	.281	.561	.348	.561	.348	.665	.348	.665	22-18	5		
24-16	23.55	$\frac{1}{4}$	$\frac{3}{8}$	.297	.375	.297	.603	.375	.603	.375	.713	.375	.713	24-16	6		

For illustration see page 250.

# **No. 123.** **HARDENED AND GROUND STEEL MANDRELS.**



These Mandrels are tapered .006 to .010 inch in 12 inches, sizes  $\frac{1}{4}$  inch to 4 inches inclusive. They correspond in size to our Reamers and will fit holes reamed by them.

Other tapers per foot can be furnished at special prices.

Size of Mandrel stamped on large end.

Diameter, Inches.	Price Each.	Whole Length, Inches.	Diameter, Inches.	Price Each.	Whole Length Inches.
$\frac{1}{4}$	\$ .65	$3\frac{3}{4}$	$2\frac{3}{16}$	\$6.00	12
$\frac{5}{16}$	.75	4	$2\frac{1}{4}$	6.50	12
$\frac{3}{8}$	.85	$4\frac{1}{4}$	$2\frac{5}{16}$	6.90	12
$\frac{7}{16}$	.95	$4\frac{1}{2}$	$2\frac{3}{8}$	7.40	12
$\frac{1}{2}$	1.05	5	$2\frac{7}{16}$	7.90	$12\frac{1}{2}$
$\frac{9}{16}$	1.15	$5\frac{1}{4}$	$2\frac{1}{2}$	8.40	$12\frac{1}{2}$
$\frac{5}{8}$	1.25	$5\frac{1}{2}$	$2\frac{9}{16}$	8.90	$12\frac{1}{2}$
$\frac{11}{16}$	1.35	$5\frac{3}{4}$	$2\frac{5}{8}$	9.40	$12\frac{1}{2}$
$\frac{3}{4}$	1.45	6	$2\frac{11}{16}$	9.90	13
$\frac{13}{16}$	1.55	$6\frac{1}{4}$	$2\frac{3}{4}$	10.50	13
$\frac{7}{8}$	1.70	$6\frac{1}{2}$	$2\frac{13}{16}$	11.00	13
$\frac{15}{16}$	1.85	$6\frac{3}{4}$	$2\frac{7}{8}$	11.50	13
1	2.00	7	$2\frac{15}{16}$	12.00	13
$1\frac{1}{16}$	2.10	$7\frac{1}{4}$	3	12.50	13
$1\frac{1}{8}$	2.20	$7\frac{1}{2}$	$3\frac{1}{16}$	13.00	14
$1\frac{3}{8}$	2.30	$7\frac{3}{4}$	$3\frac{1}{8}$	13.40	14
$1\frac{1}{4}$	2.45	8	$3\frac{3}{16}$	13.80	14
$1\frac{5}{8}$	2.60	$8\frac{1}{4}$	$3\frac{1}{4}$	14.10	14
$1\frac{3}{4}$	2.75	$8\frac{1}{2}$	$3\frac{5}{16}$	14.40	15
$1\frac{7}{8}$	2.90	$8\frac{3}{4}$	$3\frac{3}{8}$	14.70	15
$1\frac{1}{2}$	3.10	9	$3\frac{7}{16}$	15.00	15
$1\frac{9}{16}$	3.30	$9\frac{1}{4}$	$3\frac{1}{2}$	15.30	15
$1\frac{5}{8}$	3.50	$9\frac{1}{2}$	$3\frac{9}{16}$	15.60	16
$1\frac{11}{16}$	3.70	$9\frac{3}{4}$	$3\frac{5}{8}$	15.90	16
$1\frac{3}{4}$	3.90	10	$3\frac{11}{16}$	16.20	16
$1\frac{13}{16}$	4.10	$10\frac{1}{4}$	$3\frac{3}{4}$	16.50	16
$1\frac{7}{8}$	4.35	$10\frac{1}{2}$	$3\frac{13}{16}$	16.80	17
$1\frac{15}{16}$	4.60	$10\frac{3}{4}$	$3\frac{7}{8}$	17.20	17
2	4.80	11	$3\frac{15}{16}$	17.60	17
$2\frac{1}{16}$	5.15	$11\frac{1}{2}$	4	18.00	17
$2\frac{1}{8}$	5.60	$11\frac{1}{2}$			

**No. 123 A.**  
**TAPER MANDRELS WITH EXPANDING**  
**SLEEVES.**



The entire Mandrel is hardened and the taper ground. The taper is such that it will hold the Sleeve and the work rigid. The Sleeve is of crucible steel, not hardened, and has several longitudinal slots giving the Sleeve greater flexibility. One of the slots is cut through allowing the Sleeve to expand or contract.

Diameter Sleeve, Inches.	Price Each, Sleeve without Mandrel.	Length of Sleeve, Inches.	Fitting Taper Mandrel, Number.	Price Each, Mandrel without Sleeve	Whole Length, Inches.
$\frac{1}{2}$	\$ .95	$1\frac{1}{2}$	4	\$1.85	5
$\frac{7}{16}$	.95	$1\frac{1}{2}$	4	1.85	5
$\frac{9}{16}$	1.05	$1\frac{5}{8}$	6	2.00	$5\frac{1}{4}$
$\frac{11}{16}$	1.05	$1\frac{5}{8}$	6	2.00	$5\frac{1}{4}$
$\frac{5}{8}$	1.15	$1\frac{3}{4}$	8	2.15	$5\frac{1}{2}$
$\frac{11}{16}$	1.15	$1\frac{3}{4}$	8	2.15	$5\frac{1}{2}$
$\frac{13}{16}$	1.25	$1\frac{7}{8}$	10	2.30	$5\frac{3}{4}$
$\frac{15}{16}$	1.25	$1\frac{7}{8}$	10	2.30	$5\frac{3}{4}$
$\frac{3}{4}$	1.35	2	12	2.50	6
$\frac{13}{16}$	1.35	2	12	2.50	6
$\frac{11}{16}$	1.45	$2\frac{1}{8}$	14	2.70	$6\frac{1}{2}$
$\frac{13}{16}$	1.45	$2\frac{1}{8}$	14	2.70	$6\frac{1}{2}$
$\frac{7}{8}$	1.55	$2\frac{1}{4}$	14	2.70	$6\frac{1}{2}$
$\frac{29}{32}$	1.55	$2\frac{1}{4}$	14	2.70	$6\frac{1}{2}$
$\frac{15}{16}$	1.80	$2\frac{3}{8}$	16	3.00	$7\frac{1}{2}$
$\frac{31}{32}$	1.80	$2\frac{3}{8}$	16	3.00	$7\frac{1}{2}$
1	1.95	$2\frac{3}{8}$	16	3.00	$7\frac{1}{2}$
$1\frac{1}{32}$	1.95	$2\frac{1}{2}$	16	3.00	$7\frac{1}{2}$
$1\frac{1}{16}$	2.10	$2\frac{1}{2}$	16	3.00	$7\frac{1}{2}$
$1\frac{3}{32}$	2.10	$2\frac{1}{2}$	16	3.00	$7\frac{1}{2}$
$1\frac{1}{8}$	2.40	$2\frac{5}{8}$	18	4.15	$8\frac{1}{2}$



**No. 123 A.**  
**TAPER MANDRELS WITH EXPANDING**  
**SLEEVES.**

Diameter Sleeve, Inches.	Price Each, Sleeve without Mandrel.	Length of Sleeve, Inches.	Fitting Taper Mandrel, Number.	Price Each, Mandrel without Sleeve.	Whole Length, Inches.
1 $\frac{5}{32}$	\$2.40	2 $\frac{5}{8}$	18	\$4.15	8 $\frac{1}{2}$
1 $\frac{3}{16}$	2.50	2 $\frac{5}{8}$	18	4.15	8 $\frac{1}{2}$
1 $\frac{1}{8}$	2.50	2 $\frac{5}{8}$	18	4.15	8 $\frac{1}{2}$
1 $\frac{1}{4}$	2.60	2 $\frac{3}{4}$	18	4.15	8 $\frac{1}{2}$
1 $\frac{9}{32}$	2.60	2 $\frac{3}{4}$	18	4.15	8 $\frac{1}{2}$
1 $\frac{5}{16}$	2.70	2 $\frac{3}{4}$	18	4.15	8 $\frac{1}{2}$
1 $\frac{11}{32}$	2.70	2 $\frac{3}{4}$	18	4.15	8 $\frac{1}{2}$
1 $\frac{3}{8}$	3.10	3	20	5.30	9 $\frac{1}{2}$
1 $\frac{13}{32}$	3.10	3	20	5.30	9 $\frac{1}{2}$
1 $\frac{7}{16}$	3.20	3	20	5.30	9 $\frac{1}{2}$
1 $\frac{15}{32}$	3.20	3	20	5.30	9 $\frac{1}{2}$
1 $\frac{1}{2}$	3.30	3 $\frac{1}{4}$	20	5.30	9 $\frac{1}{2}$
1 $\frac{17}{32}$	3.30	3 $\frac{1}{4}$	20	5.30	9 $\frac{1}{2}$
1 $\frac{9}{16}$	3.40	3 $\frac{1}{4}$	20	5.30	9 $\frac{1}{2}$
1 $\frac{19}{32}$	3.40	3 $\frac{1}{4}$	20	5.30	9 $\frac{1}{2}$
1 $\frac{5}{8}$	3.70	3 $\frac{3}{8}$	22	6.50	10 $\frac{1}{2}$
1 $\frac{21}{32}$	3.70	3 $\frac{3}{8}$	22	6.50	10 $\frac{1}{2}$
1 $\frac{11}{16}$	3.80	3 $\frac{3}{8}$	22	6.50	10 $\frac{1}{2}$
1 $\frac{23}{32}$	3.80	3 $\frac{3}{8}$	22	6.50	10 $\frac{1}{2}$
1 $\frac{3}{4}$	3.90	3 $\frac{3}{8}$	22	6.50	10 $\frac{1}{2}$
1 $\frac{25}{32}$	3.90	3 $\frac{1}{2}$	22	6.50	10 $\frac{1}{2}$
1 $\frac{13}{16}$	4.00	3 $\frac{1}{2}$	22	6.50	10 $\frac{1}{2}$
1 $\frac{27}{32}$	4.00	3 $\frac{1}{2}$	22	6.50	10 $\frac{1}{2}$
1 $\frac{7}{8}$	4.10	3 $\frac{1}{2}$	22	6.50	10 $\frac{1}{2}$
1 $\frac{29}{32}$	4.10	3 $\frac{1}{2}$	22	6.50	10 $\frac{1}{2}$
1 $\frac{15}{16}$	4.40	3 $\frac{3}{4}$	24	7.75	11 $\frac{1}{2}$
1 $\frac{31}{32}$	4.40	3 $\frac{3}{4}$	24	7.75	11 $\frac{1}{2}$
2	4.50	3 $\frac{3}{4}$	24	7.75	11 $\frac{1}{2}$
2 $\frac{1}{32}$	4.50	3 $\frac{3}{4}$	24	7.75	11 $\frac{1}{2}$
2 $\frac{1}{16}$	4.60	3 $\frac{3}{4}$	24	7.75	11 $\frac{1}{2}$
2 $\frac{1}{8}$	4.60	3 $\frac{7}{8}$	24	7.75	11 $\frac{1}{2}$

## No. 123 A.

TAPER MANDRELS WITH EXPANDING  
SLEEVES.

Diameter, Sleeve, Inches.	Price Each, Sleeve without Mandrel.	Length of Sleeve, Inches.	Fitting Taper Mandrel, Number.	Price Each, Mandrel without Sleeve.	Whole Length, Inches.
$2\frac{1}{8}$	\$4.70	$3\frac{7}{8}$	24	\$7.75	$11\frac{1}{2}$
$2\frac{1}{4}$	4.70	$3\frac{7}{8}$	24	7.75	$11\frac{1}{2}$
$2\frac{3}{8}$	4.80	$3\frac{7}{8}$	24	7.75	$11\frac{1}{2}$
$2\frac{1}{2}$	4.80	$3\frac{7}{8}$	24	7.75	$11\frac{1}{2}$
$2\frac{3}{4}$	5.10	4	26	9.00	$12\frac{1}{2}$
$2\frac{7}{8}$	5.10	4	26	9.00	$12\frac{1}{2}$
$2\frac{15}{16}$	5.20	4	26	9.00	$12\frac{1}{2}$
$2\frac{1}{2}$	5.20	4	26	9.00	$12\frac{1}{2}$
$2\frac{3}{8}$	5.30	4	26	9.00	$12\frac{1}{2}$
$2\frac{1}{2}$	5.30	$4\frac{1}{4}$	26	9.00	$12\frac{1}{2}$
$2\frac{7}{8}$	5.40	$4\frac{1}{4}$	26	9.00	$12\frac{1}{2}$
$2\frac{15}{16}$	5.40	$4\frac{1}{4}$	26	9.00	$12\frac{1}{2}$
$2\frac{1}{2}$	5.50	$4\frac{1}{4}$	26	9.00	$12\frac{1}{2}$
$2\frac{1}{2}$	5.50	$4\frac{1}{4}$	26	9.00	$12\frac{1}{2}$
$2\frac{3}{8}$	5.90	$4\frac{1}{2}$	28	12.10	$13\frac{1}{2}$
$2\frac{1}{2}$	5.90	$4\frac{1}{2}$	28	12.10	$13\frac{1}{2}$
$2\frac{5}{8}$	6.00	$4\frac{1}{2}$	28	12.10	$13\frac{1}{2}$
$2\frac{1}{2}$	6.00	$4\frac{1}{2}$	28	12.10	$13\frac{1}{2}$
$2\frac{1}{8}$	6.10	$4\frac{1}{2}$	28	12.10	$13\frac{1}{2}$
$2\frac{1}{2}$	6.10	$4\frac{1}{2}$	28	12.10	$13\frac{1}{2}$
$2\frac{3}{4}$	6.20	$4\frac{3}{4}$	28	12.10	$13\frac{1}{2}$
$2\frac{1}{2}$	6.20	$4\frac{3}{4}$	28	12.10	$13\frac{1}{2}$
$2\frac{1}{8}$	6.30	$4\frac{3}{4}$	28	12.10	$13\frac{1}{2}$
$2\frac{1}{2}$	6.30	$4\frac{3}{4}$	28	12.10	$13\frac{1}{2}$
$2\frac{7}{8}$	6.40	$4\frac{3}{4}$	28	12.10	$13\frac{1}{2}$
$2\frac{1}{2}$	6.40	$4\frac{3}{4}$	28	12.10	$13\frac{1}{2}$
$2\frac{1}{8}$	6.80	5	30	15.50	$14\frac{1}{2}$
$2\frac{1}{2}$	6.80	5	30	15.50	$14\frac{1}{2}$
3	6.90	5	30	15.50	$14\frac{1}{2}$
$3\frac{1}{2}$	6.90	5	30	15.50	$14\frac{1}{2}$

## No. 123 A.

## TAPER MANDRELS WITH EXPANDING SLEEVES.

Diameter Sleeve, Inches.	Price Each Sleeve Without Mandrel.	Length of Sleeve, Inches.	Fitting Taper Mandrel, Number.	Price Each Mandrel Without Sleeve	Whole Length, Inches.
$3\frac{1}{16}$	7.10	5	30	15.50	$14\frac{1}{2}$
$3\frac{3}{32}$	7.10	5	30	15.50	$14\frac{1}{2}$
$3\frac{1}{8}$	7.30	$5\frac{1}{4}$	30	15.50	$14\frac{1}{2}$
$3\frac{5}{32}$	7.30	$5\frac{1}{4}$	30	15.50	$14\frac{1}{2}$
$3\frac{3}{16}$	7.50	$5\frac{1}{4}$	30	15.50	$14\frac{1}{2}$
$3\frac{7}{32}$	7.50	$5\frac{1}{4}$	30	15.50	$14\frac{1}{2}$
$3\frac{1}{4}$	7.70	$5\frac{1}{4}$	30	15.50	$14\frac{1}{2}$
$3\frac{5}{16}$	7.70	$5\frac{1}{4}$	30	15.50	$14\frac{1}{2}$
$3\frac{11}{16}$	7.90	$5\frac{1}{2}$	32	19.50	$15\frac{1}{2}$
$3\frac{1}{2}$	7.90	$5\frac{1}{2}$	32	19.50	$15\frac{1}{2}$
$3\frac{3}{8}$	8.10	$5\frac{1}{2}$	32	19.50	$15\frac{1}{2}$
$3\frac{7}{8}$	8.10	$5\frac{1}{2}$	32	19.50	$15\frac{1}{2}$
$3\frac{1}{4}$	8.30	$5\frac{1}{2}$	32	19.50	$15\frac{1}{2}$
$3\frac{5}{8}$	8.30	$5\frac{1}{2}$	32	19.50	$15\frac{1}{2}$
$3\frac{1}{2}$	8.50	$5\frac{1}{2}$	32	19.50	$15\frac{1}{2}$
$3\frac{7}{8}$	8.50	$5\frac{3}{4}$	32	19.50	$15\frac{1}{2}$
$3\frac{9}{8}$	8.70	$5\frac{3}{4}$	32	19.50	$15\frac{1}{2}$
$3\frac{11}{8}$	8.70	$5\frac{3}{4}$	32	19.50	$15\frac{1}{2}$
$3\frac{5}{4}$	8.90	$5\frac{3}{4}$	32	19.50	$15\frac{1}{2}$
$3\frac{11}{4}$	8.90	$5\frac{3}{4}$	32	19.50	$15\frac{1}{2}$
$3\frac{13}{4}$	9.10	$5\frac{3}{4}$	32	19.50	$15\frac{1}{2}$
$3\frac{3}{2}$	9.10	$5\frac{3}{4}$	32	19.50	$15\frac{1}{2}$
$3\frac{7}{4}$	9.30	6	34	24.00	$16\frac{1}{2}$
$3\frac{9}{4}$	9.30	6	34	24.00	$16\frac{1}{2}$
$3\frac{11}{4}$	9.50	6	34	24.00	$16\frac{1}{2}$
$3\frac{13}{4}$	9.50	6	34	24.00	$16\frac{1}{2}$
$3\frac{7}{2}$	9.70	6	34	24.00	$16\frac{1}{2}$
$3\frac{9}{2}$	9.70	6	34	24.00	$16\frac{1}{2}$
$3\frac{11}{2}$	9.90	6	34	24.00	$16\frac{1}{2}$
$3\frac{13}{2}$	9.90	6	34	24.00	$16\frac{1}{2}$
4	10.10	6	34	24.00	$16\frac{1}{2}$

# **No. 136 A.** **TAPER PINS.**

M.T.D. & M.CO.

**Taper  $\frac{1}{4}$  inch to the foot.** If ordering sizes other than those included in the list specify the length and the size at the large end.

For Taper Pin Reamers see page 200-202.

## **PRICE PER HUNDRED.**

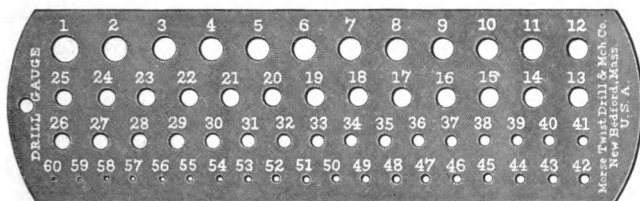
No.	0	1	2	3	4	5	6	7	8	9	10
Diam. at Large End Inches	.156	.172	.193	.219	.250	.289	.341	.409	.492	.591	.706
Approximate Fractional Sizes.	$\frac{5}{32}$	$\frac{11}{64}$	$\frac{3}{16}$	$\frac{7}{32}$	$\frac{1}{4}$	$\frac{19}{64}$	$\frac{11}{32}$	$\frac{13}{32}$	$\frac{1}{2}$	$\frac{19}{32}$	$\frac{23}{32}$
Length Inches.											
$\frac{3}{4}$	\$1.80	\$2.00	\$2.10	\$2.30	\$2.50	\$2.75	\$3.00	. . .	. . .	. . .	. . .
1	2.05	2.25	2.35	2.55	2.75	3.00	3.25	\$3.75	. . .	. . .	. . .
$1\frac{1}{4}$	*2.30	2.50	2.60	2.80	3.00	3.25	3.50	4.00	\$4.65	. . .	. . .
$1\frac{1}{2}$	2.55	*2.75	2.85	3.05	3.25	3.50	3.75	4.25	5.00	\$7.00	\$9.00
$1\frac{3}{4}$	2.80	3.00	*3.10	3.30	3.50	3.75	4.00	4.50	5.40	7.50	9.50
2	. .	3.25	3.35	*3.55	3.75	4.05	4.35	4.75	5.80	8.00	10.00
$2\frac{1}{4}$	. .	. .	3.60	3.80	*4.00	4.40	4.75	5.25	6.25	8.60	10.75
$2\frac{1}{2}$	. .	. .	. .	4.05	4.25	*4.75	5.20	5.75	6.75	9.20	11.50
$2\frac{3}{4}$	. .	. .	. .	4.30	4.50	5.10	5.70	6.25	7.25	9.80	12.25
3	. .	. .	. .	4.55	4.75	5.45	6.25	6.75	7.80	10.50	13.25
$3\frac{1}{4}$	. .	. .	. .	. .	. .	. .	*6.75	7.25	8.40	11.20	14.25
$3\frac{1}{2}$	. .	. .	. .	. .	. .	. .	7.25	7.75	9.00	11.90	15.25
$3\frac{3}{4}$	. .	. .	. .	. .	. .	. .	7.75	8.25	9.60	12.60	16.25
4	. .	. .	. .	. .	. .	. .	8.25	*8.75	10.20	13.30	17.25
$4\frac{1}{4}$	. .	. .	. .	. .	. .	. .	. .	. .	10.80	14.00	18.25
$4\frac{1}{2}$	. .	. .	. .	. .	. .	. .	. .	. .	11.40	14.70	19.25
$4\frac{3}{4}$	. .	. .	. .	. .	. .	. .	. .	. .	. .	15.40	20.25
5	. .	. .	. .	. .	. .	. .	. .	. .	. .	16.10	21.25
$5\frac{1}{4}$	. .	. .	. .	. .	. .	. .	. .	. .	. .	16.80	22.25
$5\frac{1}{2}$	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	23.25
$5\frac{3}{4}$	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	24.25
6	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	25.25

\*Pins marked with \* are too long for use with regular Taper Pin Reamers of corresponding numbers.

Special attention is called to the fact that our Taper Pins are highly polished and finely finished.

**No. 127.****MORSE TWIST DRILL GAUGE.**

NUMBER SIZES 1 TO 60



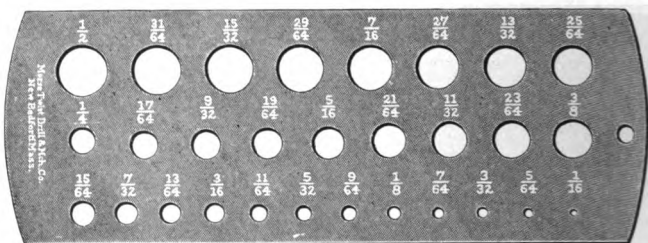
Price \$1.50 Each.

Decimal Equivalents stamped on the reverse side of this gauge. See table.

Number.	Decimal Equivalent.	Number.	Decimal Equivalent.	Number.	Decimal Equivalent.
1	.2280	21	.1590	41	.0960
2	.2210	22	.1570	42	.0935
3	.2130	23	.1540	43	.0890
4	.2090	24	.1520	44	.0860
5	.2055	25	.1495	45	.0820
6	.2040	26	.1470	46	.0810
7	.2010	27	.1440	47	.0785
8	.1990	28	.1405	48	.0760
9	.1960	29	.1360	49	.0730
10	.1935	30	.1285	50	.0700
11	.1910	31	.1200	51	.0670
12	.1890	32	.1160	52	.0635
13	.1850	33	.1130	53	.0595
14	.1820	34	.1110	54	.0550
15	.1800	35	.1100	55	.0520
16	.1770	36	.1065	56	.0465
17	.1730	37	.1040	57	.0430
18	.1695	38	.1015	58	.0420
19	.1660	39	.0995	59	.0410
20	.1610	40	.0980	60	.0400

Furnished either black or polished.

**No. 127 A.**  
**MORSE TWIST DRILL GAUGE.**  
 FRACTIONAL SIZES  $\frac{1}{8}$  TO  $\frac{1}{2}$



Price, \$2.25 each.

Decimal Equivalents stamped on the reverse side of this gauge. See Table.

Size.	Decimal Equiv.	Size.	Decimal Equiv.	Size.	Decimal Equiv.	Size.	Decimal Equiv.	Size.	Decimal Equiv.
$\frac{1}{16}$	.0625	$\frac{5}{32}$	.1562	$\frac{1}{4}$	.2500	$\frac{11}{32}$	.3437	$\frac{7}{16}$	.4375
$\frac{5}{64}$	.0781	$\frac{11}{64}$	.1718	$\frac{17}{64}$	.2656	$\frac{23}{64}$	.3593	$\frac{29}{64}$	.4531
$\frac{3}{32}$	.0937	$\frac{9}{16}$	.1875	$\frac{9}{32}$	.2812	$\frac{9}{8}$	.3750	$\frac{15}{32}$	.4687
$\frac{7}{64}$	.1093	$\frac{13}{64}$	.2031	$\frac{19}{64}$	.2968	$\frac{25}{64}$	.3906	$\frac{31}{64}$	.4843
$\frac{1}{8}$	.1250	$\frac{7}{32}$	.2187	$\frac{5}{16}$	.3125	$\frac{13}{32}$	.4062	$\frac{31}{16}$	.5000
$\frac{9}{64}$	.1406	$\frac{15}{64}$	.2343	$\frac{21}{64}$	.3281	$\frac{27}{64}$	.4218		

Furnished either black or polished.

**No. 127 B.**  
**MORSE TWIST DRILL GAUGE.**  
 NUMBER SIZES 61 TO 80

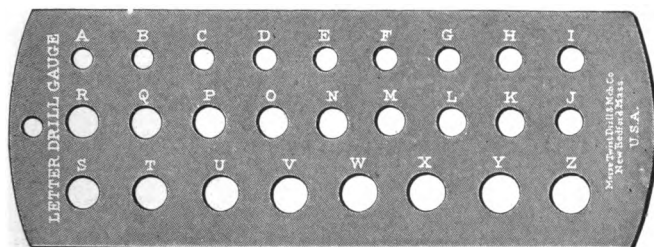


Price, \$2.00 each.

Decimal Equivalents stamped on the reverse side of this gauge. See table.

Number.	Decimal Equivalent.	Number.	Decimal Equivalent.
61	.039	71	.026
62	.038	72	.025
63	.037	73	.024
64	.036	74	.0225
65	.035	75	.021
66	.033	76	.02
67	.032	77	.018
68	.031	78	.016
69	.0292	79	.0145
70	.028	80	.0135

**No. 127 C.**  
**MORSE TWIST DRILL GAUGE.**  
 LETTER SIZES A TO Z

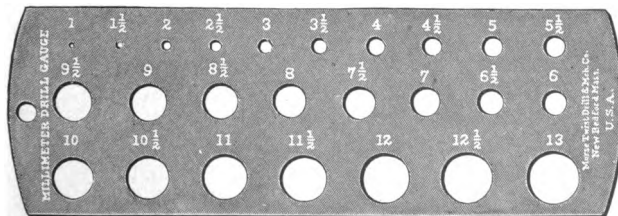


**Price \$3.00 Each.**

Decimal Equivalents stamped on the reverse side of this gauge. See table.

Size	Dec. Equiv.	Size	Dec. Equiv.	Size	Dec. Equiv.	Size	Dec. Equiv.	Size	Dec. Equiv.
<b>A</b>	.234	<b>F</b>	.257	<b>K</b>	.281	<b>P</b>	.323	<b>U</b>	.368
<b>B</b>	.238	<b>G</b>	.261	<b>L</b>	.290	<b>Q</b>	.332	<b>V</b>	.377
<b>C</b>	.242	<b>H</b>	.266	<b>M</b>	.295	<b>R</b>	.339	<b>W</b>	.386
<b>D</b>	.246	<b>I</b>	.272	<b>N</b>	.302	<b>S</b>	.348	<b>X</b>	.397
<b>E</b>	.250	<b>J</b>	.277	<b>O</b>	.316	<b>T</b>	.358	<b>Y</b>	.404
								<b>Z</b>	.413

**No. 127 D.**  
**MORSE TWIST DRILL GAUGE.**  
 MILLIMETER SIZES 1 TO 13



**Price \$3.00 Each**

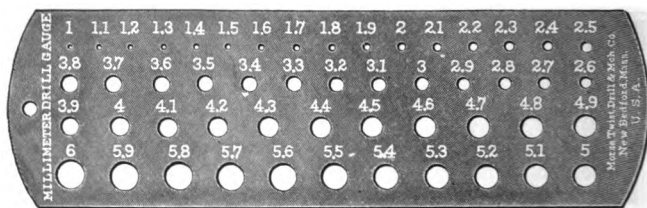
Decimal Equivalents stamped on the reverse side of this gauge. See table.

Size M.M.	Dec. Equiv.	Size M.M.	Dec. Equiv.	Size M.M.	Dec. Equiv.	Size M.M.	Dec. Equiv.	Size M.M.	Dec. Equiv.
<b>1</b>	.0394	<b>3½</b>	.1378	<b>6</b>	.2362	<b>8½</b>	.3346	<b>11</b>	.4331
<b>1½</b>	.0590	<b>4</b>	.1575	<b>6½</b>	.2559	<b>9</b>	.3543	<b>11½</b>	.4527
<b>2</b>	.0787	<b>4½</b>	.1771	<b>7</b>	.2756	<b>9½</b>	.3740	<b>12</b>	.4724
<b>2½</b>	.0984	<b>5</b>	.1969	<b>7½</b>	.2952	<b>10</b>	.3937	<b>12½</b>	.4921
<b>3</b>	.1181	<b>5½</b>	.2165	<b>8</b>	.3150	<b>10½</b>	.4134	<b>13</b>	.5118

Gauges styles 127 C and 127 D furnished either black or polished.

**No. 127 E.****MORSE TWIST DRILL GAUGE.**

MILLIMETER SIZES 1 TO 6



Price, \$2.50 Each.

Decimal Equivalents stamped on the reverse side of this gauge.

SIZES IN DECIMALS OF 1 INCH.

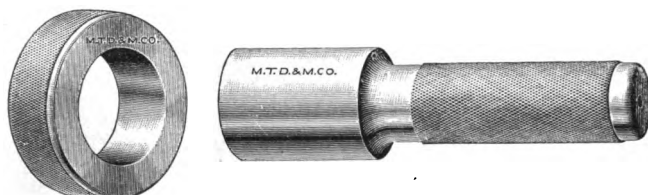
1 TO 6 M. M. BY ONE TENTH M. M.

Size M. M.	Decimal Equivalent.	Size M. M.	Decimal Equivalent.	Size M. M.	Decimal Equivalent.
1	.0393	2.7	.1063	4.4	.1732
1.1	.0433	2.8	.1102	4.5	.1771
1.2	.0472	2.9	.1141	4.6	.1811
1.3	.0511	3	.1181	4.7	.1850
1.4	.0551	3.1	.1220	4.8	.1889
1.5	.0590	3.2	.1259	4.9	.1929
1.6	.0629	3.3	.1299	5	.1968
1.7	.0669	3.4	.1338	5.1	.2007
1.8	.0708	3.5	.1378	5.2	.2047
1.9	.0748	3.6	.1417	5.3	.2086
2	.0787	3.7	.1456	5.4	.2126
2.1	.0826	3.8	.1496	5.5	.2165
2.2	.0866	3.9	.1535	5.6	.2204
2.3	.0905	4.	.1574	5.7	.2244
2.4	.0944	4.1	.1614	5.8	.2283
2.5	.0984	4.2	.1653	5.9	.2322
2.6	.1023	4.3	.1692	6	.2362

Furnished either black or polished.



# **No. 128.** **PLUG AND RING CYLINDRICAL GAUGES.**

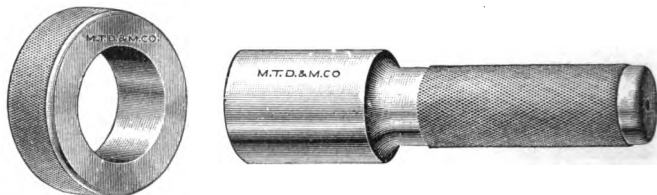


The Plug Gauge is made with a straight, knurled handle.  
The Ring Gauge is knurled on its periphery.

Size.	Price Each, Plug Gauge.	Price Each, Ring Gauge.	Price Both Plug and Ring.
$\frac{1}{4}$	\$3.00	\$4.45	\$7.45
$\frac{5}{16}$	3.00	4.60	7.60
$\frac{3}{8}$	3.10	4.75	7.85
$\frac{7}{16}$	3.20	4.90	8.10
$\frac{1}{2}$	3.30	5.05	8.35
$\frac{9}{16}$	3.40	5.20	8.60
$\frac{5}{8}$	3.50	5.35	8.85
$\frac{11}{16}$	3.60	5.50	9.10
$\frac{3}{4}$	3.70	5.65	9.35
$\frac{13}{16}$	3.80	5.80	9.60
$\frac{7}{8}$	3.90	5.95	9.85
$\frac{15}{16}$	4.00	6.10	10.10
1	4.10	6.25	10.35
$1\frac{1}{16}$	4.20	6.50	10.70
$1\frac{1}{8}$	4.30	6.75	11.05
$1\frac{1}{4}$	4.40	7.00	11.40
$1\frac{3}{8}$	4.50	7.25	11.75
$1\frac{1}{2}$	4.65	7.50	12.15
$1\frac{5}{8}$	4.80	7.75	12.55
$1\frac{3}{4}$	4.95	8.00	12.95
$1\frac{7}{8}$	5.10	8.25	13.35
2	5.25	8.50	13.75
$2\frac{1}{16}$	5.40	8.75	14.15
$2\frac{1}{8}$	5.55	9.00	14.55
$2\frac{1}{4}$	5.70	9.25	14.95
$2\frac{3}{8}$	5.85	9.50	15.35
$2\frac{1}{2}$	6.00	9.75	15.75
$2\frac{5}{8}$	6.15	10.00	16.15
3	6.30	10.25	16.55
$3\frac{1}{16}$	7.00	11.00	18.00
$3\frac{1}{8}$	7.15	11.25	18.40
$3\frac{1}{4}$	7.30	11.50	18.80
$3\frac{3}{8}$	7.45	11.75	19.20
$3\frac{1}{2}$	7.60	12.00	19.60

## No. 128.

## PLUG AND RING CYLINDRICAL GAUGES.



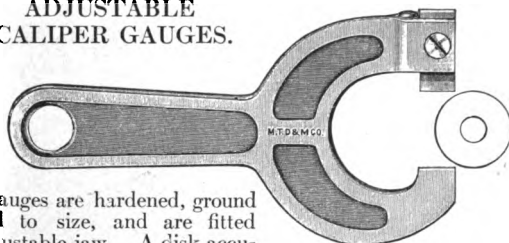
The Plug Gauge is made with a straight, knurled handle.  
The Ring Gauge is knurled on its periphery.

Size.	Price Each. Plug Gauge.	Price Each Ring Gauge.	Price Both Plug and Ring.
$2\frac{3}{8}$	\$7.85	\$12.25	\$20.10
$2\frac{7}{16}$	8.10	12.50	20.60
$2\frac{1}{2}$	8.25	12.75	21.00
$2\frac{9}{16}$	8.40	13.00	21.40
$2\frac{5}{8}$	8.55	13.25	21.80
$2\frac{11}{16}$	8.70	13.50	22.20
$2\frac{3}{4}$	8.85	13.75	22.60
$2\frac{13}{16}$	9.00	14.00	23.00
$2\frac{7}{8}$	9.15	14.25	23.40
$2\frac{15}{16}$	9.30	14.50	23.80
3	9.45	14.75	24.20

Gauges larger than 3 inches take a different discount than 3 inches and smaller.

$3\frac{1}{8}$	\$9.80	\$11.40	\$21.20
$3\frac{1}{4}$	10.60	12.15	22.75
$3\frac{3}{8}$	11.40	12.90	24.30
$3\frac{1}{2}$	12.15	13.70	25.85
$3\frac{5}{8}$	13.25	14.45	27.70
$3\frac{3}{4}$	14.40	15.25	29.65
$3\frac{7}{8}$	15.55	15.95	31.50
4	16.75	16.85	33.60
$4\frac{1}{4}$	18.60	18.20	36.80
$4\frac{1}{2}$	20.50	19.60	40.10
$4\frac{3}{4}$	22.60	20.85	43.45
5	24.65	22.25	46.90
$5\frac{1}{4}$	27.10	23.50	50.60
$5\frac{1}{2}$	29.45	24.75	54.20
$5\frac{3}{4}$	32.00	26.00	58.00
6	34.65	27.25	61.90

**No. 128 A.**  
**ADJUSTABLE**  
**CALIPER GAUGES.**



These Gauges are hardened, ground and lapped to size, and are fitted with an adjustable jaw. A disk accurately ground and lapped to size is furnished with each Gauge for testing and correcting the same. Sizes 2 to 3 inches have no handles.

Size.	Price Each.	Size.	Price Each.	Size.	Price Each.	Size.	Price Each.	Size.	Price Each.
$\frac{1}{4}$	\$3.75	$\frac{13}{16}$	\$3.85	$1\frac{3}{8}$	\$4.50	$1\frac{15}{16}$	\$5.70	$2\frac{1}{2}$	\$6.90
$\frac{5}{16}$	3.75	$\frac{7}{8}$	3.90	$1\frac{7}{8}$	4.60	2	5.85	$2\frac{9}{16}$	7.50
$\frac{3}{8}$	3.75	$\frac{15}{16}$	4.00	$1\frac{1}{2}$	4.65	$2\frac{1}{8}$	5.95	$2\frac{5}{8}$	7.90
$\frac{1}{2}$	3.75	1	4.05	$1\frac{9}{16}$	4.80	$2\frac{1}{4}$	6.00	$2\frac{11}{16}$	8.25
$\frac{5}{8}$	3.75	$1\frac{1}{8}$	4.15	$1\frac{5}{8}$	4.95	$2\frac{3}{8}$	6.15	$2\frac{3}{4}$	8.25
$\frac{3}{4}$	3.75	$1\frac{1}{4}$	4.20	$1\frac{11}{16}$	5.10	$2\frac{1}{2}$	6.30	$2\frac{13}{16}$	9.00
$\frac{7}{8}$	3.75	$1\frac{3}{8}$	4.30	$1\frac{3}{4}$	5.25	$2\frac{5}{8}$	6.45	$2\frac{7}{8}$	9.00
$1\frac{1}{8}$	3.75	$1\frac{1}{2}$	4.35	$1\frac{13}{16}$	5.40	$2\frac{3}{4}$	6.60	$2\frac{15}{16}$	9.00
$1\frac{1}{4}$	3.75	$1\frac{5}{8}$	4.45	$1\frac{7}{8}$	5.55	$2\frac{7}{8}$	6.75	3	9.75

A Set of Adjustable Caliper Gauges in box, sizes from  $\frac{1}{4}$  inch to 2 inches inclusive varying by 16ths.

Price \$125.00.

For set, sizes  $\frac{1}{4}$  inch to 3 inches inclusive by 16ths.

Price \$245.00.

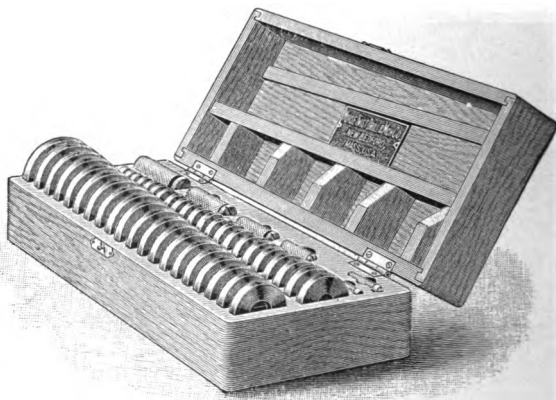


**No. 128B.****STANDARD REFERENCE DISKS.**

These Disks are hardened, ground and lapped to size. They are furnished singly or in sets. A set consists of 45 Disks from  $\frac{1}{4}$  inch to 3 inches by 16ths including 6 Handles, in a wooden case.

These Disks are not recommended for use in place of Standard size Cylindrical Gauges, but are useful for setting calipers, testing snap gauges and for reference for accurate sizes in shop practice.

Price per set in Case \$50.00



Size.	Price Each.	Size.	Price Each.	Size.	Price Each.	Size.	Price Each.
$\frac{1}{4}$	\$1.50	1	\$1.10	$1\frac{3}{4}$	\$1.40	$2\frac{1}{2}$	1.80
$\frac{5}{16}$	1.50	$1\frac{1}{16}$	1.10	$1\frac{11}{16}$	1.55	$2\frac{9}{16}$	1.95
$\frac{3}{8}$	.90	$1\frac{1}{8}$	1.10	$1\frac{7}{8}$	1.55	$2\frac{5}{8}$	1.95
$\frac{7}{16}$	.90	$1\frac{3}{16}$	1.10	$1\frac{13}{16}$	1.55	$2\frac{11}{16}$	1.95
$\frac{1}{2}$	1.00	$1\frac{1}{4}$	1.10	2	1.55	$2\frac{3}{4}$	2.10
$\frac{9}{16}$	1.00	$1\frac{5}{16}$	1.25	$2\frac{1}{16}$	1.65	$2\frac{13}{16}$	2.10
$\frac{5}{8}$	1.00	$1\frac{3}{8}$	1.25	$2\frac{1}{8}$	1.65	$2\frac{7}{8}$	2.25
$\frac{11}{16}$	1.00	$1\frac{7}{16}$	1.25	$2\frac{3}{16}$	1.65	$2\frac{15}{16}$	2.25
$\frac{3}{4}$	1.05	$1\frac{1}{2}$	1.25	$2\frac{1}{4}$	1.65	3	2.25
$\frac{13}{16}$	1.05	$1\frac{9}{16}$	1.40	$2\frac{5}{16}$	1.80		
$\frac{7}{8}$	1.05	$1\frac{5}{8}$	1.40	$2\frac{3}{8}$	1.80		
$1\frac{1}{8}$	1.05	$1\frac{11}{16}$	1.40	$2\frac{7}{16}$	1.80		

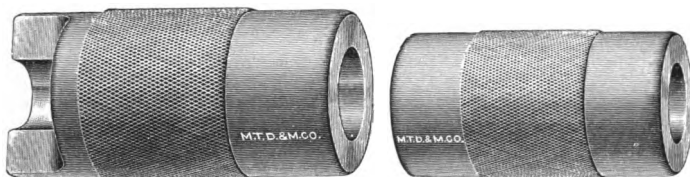
Disks  $\frac{1}{4}$  and  $\frac{5}{16}$  inches are always furnished with handles.

**HANDLES.**

Price Each.

For Disks from $\frac{3}{8}$ inch to $\frac{9}{16}$ inch, inclusive, . . . . .	\$ .65
For Disks from $\frac{5}{8}$ inch to $1\frac{1}{16}$ inches, inclusive, . . . . .	.75
For Disks from $1\frac{1}{8}$ inches to $1\frac{3}{4}$ inches, inclusive, . . . . .	.80
For Disks from $1\frac{1}{2}$ inches to 3 inches, inclusive, . . . . .	.90

**No. 128 C.**  
**MORSE TAPER PLUG AND RING**  
**CYLINDRICAL GAUGES.**

**STYLE A. RING.****STYLE B. RING.****STYLE A. PLUG.****STYLE B. PLUG.**

Number.	Price Each, Plug Gauge.	Price Each, Ring Gauge.	Price Both. Plug and Ring
0	\$3.50	\$7.00	\$10.50
1	3.50	7.00	10.50
2	4.50	9.00	13.50
3	5.50	11.00	16.50
4	7.00	14.00	21.00
5	9.50	17.00	26.50
6	13.00	22.00	35.00
7	40.00	80.00	120.00

When ordering, give style of Plug or Ring as well as number.

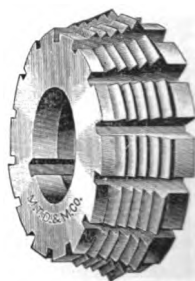
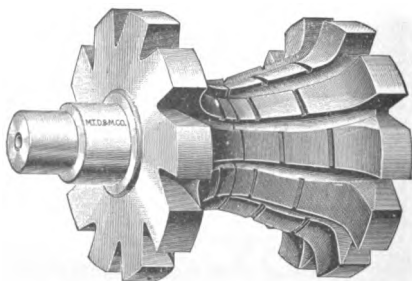
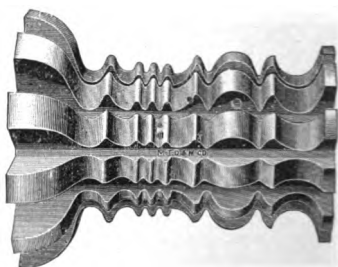
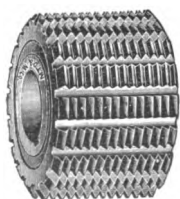
The line on each Plug Gauge denotes the depth of hole.

Gauges for Short Shanks made to order. Prices quoted on application.

**No. 126 I.****FORMED MILLING CUTTERS**

Formed Milling Cutters furnished in outlines as desired. With an order, send a sketch, a templet or a sample piece as required to be milled with the diameter of the hole for the Cutter, and state the direction in which the Cutter is to revolve. Formed Cutters are stamped with date and number, and can be duplicated, the date and number being furnished.

THESE CUTTERS CAN BE SHARPENED WITHOUT CHANGING THEIR FORM. Prices furnished on application.



# MORSE TWIST DRILL AND MACHINE CO.

## DISCOUNT SHEET

### APPLYING TO CUTTER SECTION

Pages 268 to 309 Inclusive.

<b>ANGULAR CUTTERS</b>	
Nos. 126 A, 126 R.....	
No. 126 K.....	On application.
<b>CONVEX AND CONCAVE CUTTERS</b>	
No. 126 C.....	
<b>CORNER ROUNDING CUTTERS</b>	
No. 126 N.....	
<b>COTTER MILLS</b>	
Nos. 126½ L; 126½ M.....	
<b>CUTTERS FOR GROOVING REAMERS</b>	
No. 126 H-A.....	
<b>CUTTERS FOR GROOVING TAPS</b>	
No. 126 H.....	
<b>CUTTERS FOR GROOVING TAPS AND REAMERS</b>	
Nos. 126 H-B, 126 H-C.....	
<b>CUTTERS FOR MITRE AND BEVEL GEARS</b>	
No. 131 C.....	
<b>CUTTERS FOR SPIRAL MILLS</b>	
No. 126 D.....	
No. 126 K.....	On application.
<b>CUTTERS FOR TEETH OF GEAR WHEELS</b>	
Nos. 131 B, 131 H, 131 J, 131 K, 131 L, 131 M.....	
<b>CUTTERS FOR TEETH OF GEAR WHEELS, CIRCULAR PITCH</b>	
No. 131 N.....	
<b>DOUBLE ANGLE CUTTERS</b>	
No. 126 S.....	
No. 126 T.....	On application.
<b>END MILLS</b>	
Nos. 126½ A, 126 F, 126½ F, 126½ G, 126½ H, 126 P, 126½ P.....	

CUTTERS

Continued on next page.

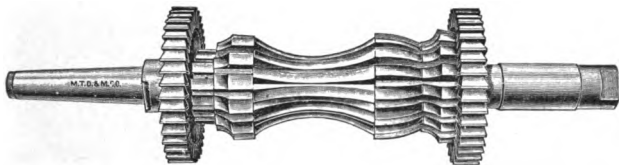
# MORSE TWIST DRILL AND MACHINE CO.

## DISCOUNT SHEET

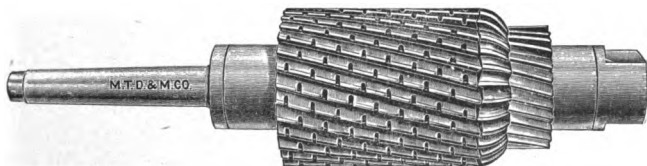
### CUTTER SECTION (CONTINUED)

<b>END MILLS WITH CENTER CUT</b>	
Nos. 126 $\frac{1}{2}$ I, 126 $\frac{1}{2}$ J .....	.....
<b>FACE MILLING CUTTERS WITH INSERTED TEETH</b>	
No. 126 Y .....	.....
No. 126 Z .....	On application.
<b>FORMED CUTTERS</b>	
Nos. 126 I, 126 K, 126 T, 126 X, 132 A .....	On application
<b>GANGS OF CUTTERS</b>	
Pages 269, 270 .....	On application.
<b>HOLLOW MILLS</b>	
Nos. 126 E, 126 $\frac{1}{2}$ E .....	.....
<b>INTERLOCKING SIDE MILLING CUTTERS</b>	
No. 126 G .....	.....
<b>LATHE THREADING TOOL</b>	
No. 130 .....	.....
<b>METAL SLITTING SAWS</b>	
No. 132 .....	.....
No. 132 A .....	On application.
<b>MILLING CUTTERS</b>	
No. 126 .....	.....
<b>MILLING CUTTERS WITH NICKED TEETH OR RADIAL GROOVES</b>	
No. 126 L .....	.....
<b>SCREW SLOTTING CUTTERS</b>	
No. 131, in lots less than 100 .....	.....
No. 131, in lots of 100 .....	.....
<b>SHELL END MILLS</b>	
Nos. 126 P, 126 $\frac{1}{2}$ P .....	.....
<b>SIDE MILLING CUTTERS</b>	
Nos. 126 B, 126 G, 126 J .....	.....
<b>SPROCKET WHEEL CUTTERS</b>	
Nos. 126 M, 126 M-A .....	.....
<b>STOCKING CUTTERS</b>	
Nos. 131 A, 131 D, 131 E, 131 F, 131 G .....	.....
<b>T SLOT CUTTERS</b>	
Nos. 126 V, 126 W .....	.....

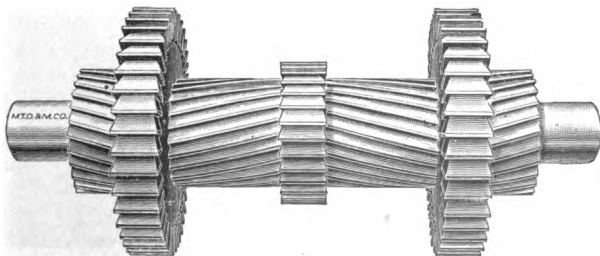


**No. 126 X.****GANG CUTTERS.****GANG OF FORMED MILLING CUTTERS AND SIDE MILLING CUTTERS.**

Whole length of Gang, . . . . .	15½ inches.
Diameter of Formed Milling Cutters, . . . . .	5 inches.
Diameter of Side Milling Cutters, . . . . .	8 inches.

**GANG OF MILLING CUTTERS ONE WITH RADIAL GROOVES.**

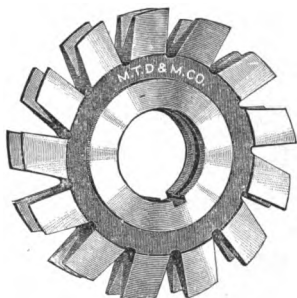
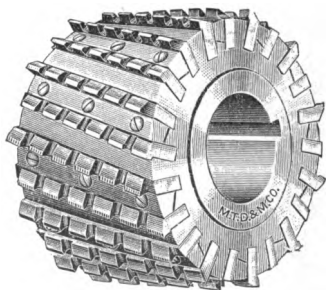
Whole length of Gang, . . . . .	9½ inches.
Diameter of Largest Cutter, . . . . .	6 inches.

**GANG OF SPIRAL MILLS AND SIDE MILLING CUTTERS.**

Diameter of Largest Cutter, . . . . .	8 inches.
Whole length of Gang, . . . . .	15 inches.
Any combination desired can be furnished; prices on application.	

**FORMED CUTTER.**

AS IT LOOKED WHEN NEW.

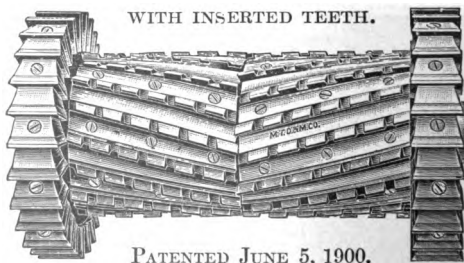
AS IT LOOKED WHEN  
PRACTICALLY WORN OUT.**No. 126 Z.****FACE MILLING  
CUTTERS**

WITH INSERTED TEETH.

In ordering give diameter, face  
of Cutter, size of hole and keyway  
required. Prices on application.  
Patented June 5, 1900.

**No. 126½ K.****GANG OF SPIRAL MILLS AND SIDE MILLING  
CUTTERS**

WITH INSERTED TEETH.



PATENTED JUNE 5, 1900.

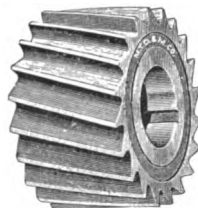
Diameter of Spiral Mills, . . . . .	6	inches.
Diameter of Side Milling Cutters, . . . . .	9	inches.
Whole length of Gang, . . . . .	15½	inches.

Any combination desired can be furnished; prices on application.



## No. 126.

## MILLING CUTTERS



Diam. Cutter, Inches.	Width of Face, Inches.	Diameter of Hole, Inches.	Price Each.	Diam. Cutter, Inches.	Width of Face, Inches.	Diameter of Hole, Inches.	Price Each.
2 1/4	3/16	7/8	\$1.30	2 3/4	7/8	1	\$1.85
2 1/4	1/2	7/8	1.75	2 3/4	1/2	1	1.90
2 1/4	1	7/8	2.50	2 3/4	3/8	1	2.00
2 1/4	1 3/4	7/8	3.30	2 3/4	5/8	1	2.10
2 1/2	3/8	1	1.30	2 3/4	1 1/8	1	2.30
2 1/2	1/4	1	1.40	2 3/4	3/4	1	2.50
2 1/2	3/8	1	1.50	2 3/4	7/8	1	2.85
2 1/2	3/8	1	1.60	2 3/4	1	1	3.10
2 1/2	1/2	1	1.70	2 3/4	1 1/8	1	3.25
2 1/2	1/2	1	1.80	2 3/4	1 1/4	1	3.40
2 1/2	5/8	1	1.90	2 3/4	1 1/2	1	3.75
2 1/2	5/8	1	2.00	2 3/4	1 3/4	1	4.00
2 1/2	1 1/8	1	2.10	2 3/4	2	1	4.20
2 1/2	1 1/8	1	2.20	2 3/4	2 1/2	1	4.60
2 1/2	1 1/8	1	2.30	2 3/4	3	1	5.00
2 1/2	1 1/8	1	2.40	2 3/4	3 1/2	1	5.50
2 1/2	1 1/8	1	2.60	2 3/4	4	1 1/4	6.00
2 1/2	1 1/8	1	2.75	2 3/4	5	1 1/4	7.40
2 1/2	1 1/4	1	2.90	2 3/4	6	1 1/4	10.00
2 1/2	1 1/2	1	3.10	3	3/16	1	1.35
2 1/2	1 3/4	1	3.40	3	1/4	1	1.60
2 1/2	2	1	3.70	3	3/8	1	1.85
2 1/2	2 1/4	1	3.90	3	1/2	1-1 1/4	2.10
2 1/2	2 1/2	1	4.10	3	5/8	1-1 1/4	2.25
2 1/2	2 3/4	1	4.25	3	1 1/2	1-1 1/4	2.40
2 1/2	3	1	4.50	3	1 5/8	1 1/4	2.55
2 1/2	3 1/2	1	5.00	3	1 3/4	1 1/4	2.70
2 1/2	4	1	5.50	3	1 7/8	1 1/4	2.85
2 1/2	5	1	6.90	3	2	1 1/4	3.00
2 1/2	6	1	8.50	3	2 1/8	1 1/4	3.30
2 3/4	3/16	1	1.30	3	1	1 1/4	3.50
2 3/4	1/4	1	1.50	3	1 1/4	1 1/4	4.00
2 3/4	3/8	1	1.60	3	1 1/2	1 1/4	4.30
2 3/4	3/8	1	1.80	3	1 3/4	1 1/4	4.50
				3	2	1 1/4	4.70

For standard keyway, see appendix, page XXII.

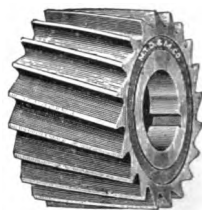
Cutters of 3/4 inch face and larger have spiral teeth unless otherwise ordered.

In ordering, carefully state diameter and face of Cutter and size of hole desired.



## No. 126.

## MILLING CUTTERS.

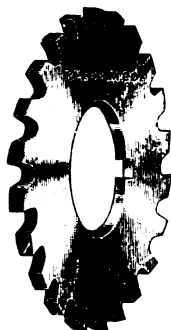


Diameter Cutter, Inches.	Width of Face, Inches.	Diameter of Hole, Inches.	Price Each.	Diameter Cutter, Inches.	Width of Face, Inches.	Diameter of Hole, Inches.	Price Each.
3	2 1/2	1 1/4	\$5.20	4	7/8	1 1/4	\$3.50
3	3	1 1/4	5.40	4	1 1/2	1 1/4-1 1/2	3.90
3	3 1/2	1 1/4	5.90	4	9/8	1 1/4	4.10
3	4	1 1/4	6.40	4	5/8	1 1/4	4.30
3	5	1 1/4	7.80	4	1 1/4	1 1/4	4.50
3	6	1 1/4	10.80	4	3/4	1 1/4-1 1/2	4.70
3 1/2	3/8	1	1.45	4	7/8	1 1/4	5.15
3 1/2	1/4	1	1.70	4	1	1 1/4-1 1/2	5.65
3 1/2	5/8	1	2.05	4	1 1/4	1 1/4-1 1/2	6.25
3 1/2	3/8	1	2.40	4	1 1/2	1 1/4-1 1/2	6.65
3 1/2	1 1/8	1	2.75	4	1 3/4	1 1/4-1 1/2	7.05
3 1/2	1 1/2	1 1/4	3.15	4	2	1 1/4-1 1/2	7.45
3 1/2	1 5/8	1 1/4	3.30	4	2 1/2	1 1/4	8.40
3 1/2	5/8	1 1/4	3.45	4	3	1 1/4-1 1/2	9.00
3 1/2	1 1/8	1 1/4	3.65	4	3 1/2	1 1/4	10.00
3 1/2	3/4	1 1/4	3.85	4	4	1 1/4-1 1/2	11.00
3 1/2	7/8	1 1/4	4.35	4	5	1 1/4-1 1/2	13.50
3 1/2	1	1 1/4	4.75	4	6	1 1/4-1 1/2	15.50
3 1/2	1 1/4	1 1/4	5.15	4 1/2	3/8	1 3/4-2	3.35
3 1/2	1 1/2	1 1/4	5.60	4 1/2	7/8	1 3/4-2	3.75
3 1/2	1 3/4	1 1/4	6.00	4 1/2	1 1/2	1 3/4-2	4.10
3 1/2	2	1 1/4	6.40	4 1/2	9/8	1 3/4-2	4.40
3 1/2	2 1/2	1 1/4	6.90	4 1/2	5/8	1 3/4-2	4.60
3 1/2	3	1 1/4	7.40	4 1/2	1 1/4	1 3/4-2	4.85
3 1/2	3 1/2	1 1/4	8.15	4 1/2	3/4	1 3/4-2	5.10
3 1/2	4	1 1/4	9.15	4 1/2	7/8	1 3/4-2	5.50
3 1/2	5	1 1/4	10.40	4 1/2	1	1 3/4-2	6.00
3 1/2	6	1 1/4	11.90	4 1/2	1 1/4	1 3/4-2	6.60
4	1/4	1-1 1/4	2.00	4 1/2	1 1/2	1 3/4-2	7.25
4	5/8	1-1 1/4	2.50	4 1/2	1 3/4	1 3/4-2	8.00
4	3/8	1-1 1/4	3.00	4 1/2	2	1 3/4-2	8.75

For Standard Keyway, see appendix, page XXII.

Cutters of 1/4 inch face and larger have spiral teeth, unless otherwise ordered.

In ordering, carefully state diameter and face of Cutter and size of hole desired.

**No. 132 A.****FORMED SAWS****FOR SLITTING COPPER.**

These saws are designed especially for the slitting or sawing of metals that are of a soft or tenacious character and are superior to the ordinary saw usually employed for this purpose. The teeth are formed and backed off the same as in all formed milling cutters, and are sharpened by grinding the face, thus retaining the outline of the saw. The sides of the saw are ground concave for clearance.

These saws are made to order.

Prices on application.

**No. 126 A.****ANGULAR CUTTERS.****RIGHT AND LEFT HAND.**

45°, 50°, 60°, 70°, 80° angle in stock.



Diameter, Inches.	Price Each.	Thickness, Inches.	Diameter of Hole. Inches.
2½	\$2.65	½	⅞
2¾	2.80	½	1
3	3.35	½	1¼
3¼	3.75	½	1½

**RIGHT  
HAND  
CUTTER.**

Angular Cutters are for Cutting the teeth of Cutters and Mills and the side teeth of Heading or Straddle Mills, but are not adapted for Spiral Milling. **KEEP CUTTERS SHARP.**

When ordering, state whether Cutter is to be Right or Left Hand.

## No. 126 B

## SIDE MILLING CUTTERS.



Diam., Inches.	Width of Face, Inches.	Diameter of Hole, Inches.	Price Each.	Diam., Inches.	Width of Face, Inches.	Diameter of Hole, Inches.	Price Each.
2	$\frac{3}{16}$	$1\frac{1}{2}$ - $\frac{5}{8}$	\$1.85	$3\frac{1}{2}$	$\frac{7}{16}$	1	\$3.75
2	$\frac{1}{4}$	$1\frac{1}{2}$ - $\frac{5}{8}$	2.00	$3\frac{1}{2}$	$\frac{1}{2}$	1	4.20
2	$\frac{3}{8}$	$1\frac{1}{2}$ - $\frac{5}{8}$	2.20	$3\frac{1}{2}$	$\frac{9}{16}$	1	4.55
$2\frac{1}{2}$	$\frac{1}{4}$	$\frac{7}{8}$	2.20	$3\frac{1}{2}$	$\frac{5}{8}$	1	4.55
$2\frac{1}{2}$	$\frac{5}{16}$	$\frac{7}{8}$	2.30	4	$\frac{1}{2}$	1	5.10
$2\frac{1}{2}$	$\frac{3}{8}$	$\frac{7}{8}$	2.45	4	$\frac{5}{8}$	$\frac{7}{8}$ -1- $1\frac{1}{4}$	5.55
$2\frac{1}{2}$	$\frac{7}{16}$	$\frac{7}{8}$	2.55	4	$\frac{3}{4}$	1	6.00
$2\frac{1}{2}$	$\frac{1}{2}$	$\frac{7}{8}$	2.65	4	$\frac{7}{8}$	1	6.50
$2\frac{3}{4}$	$\frac{1}{4}$	$\frac{7}{8}$	2.30	5	$\frac{3}{4}$	1- $1\frac{1}{4}$	6.35
$2\frac{3}{4}$	$\frac{5}{16}$	$\frac{7}{8}$	2.50	5	$\frac{7}{8}$	1	6.90
$2\frac{3}{4}$	$\frac{3}{8}$	$\frac{7}{8}$	2.65	5	1	1	7.80
$2\frac{3}{4}$	$\frac{7}{16}$	$\frac{7}{8}$	2.75	6	$\frac{3}{4}$	1	7.60
$2\frac{3}{4}$	$\frac{1}{2}$	$\frac{7}{8}$	2.80	6	$\frac{13}{16}$	$1\frac{1}{4}$ - $1\frac{1}{2}$	8.65
3	$\frac{1}{4}$	1	2.45	6	1	1- $1\frac{1}{4}$	8.65
3	$\frac{5}{16}$	1	2.75	7	1	$1\frac{1}{4}$	16.10
3	$\frac{3}{8}$	1	3.00	7	$1\frac{1}{8}$	$1\frac{1}{4}$	17.25
3	$\frac{7}{16}$	1	3.20	8	1	$1\frac{1}{4}$	19.55
3	$\frac{1}{2}$	1	3.35	8	$1\frac{3}{8}$	$1\frac{1}{4}$ , $1\frac{1}{2}$ , $1\frac{3}{4}$ , 2	23.00

Side Milling Cutters larger than 8 inches diameter furnished with inserted teeth.

Unless otherwise ordered, Cutters of this style up to 2 inches in width, will be furnished with straight teeth; wider than 2 inches with spiral teeth.

## No. 126 G.

## INTERLOCKING CUTTERS.



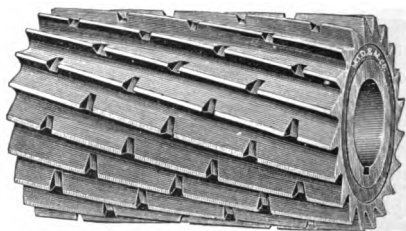
Diam. of Cutter, Inches.	Face for Slot, Inches.	Diameter of Hole, Inches.	Price Per Pair.	Diam. of Cutter, Inches.	Face for Slot, Inches.	Diameter of Hole, Inches.	Price Per Pair.
2	$\frac{3}{8}$	$\frac{1}{2}$ - $\frac{5}{8}$	\$3.70	3	1	1	\$6.70
2	$\frac{1}{2}$	$\frac{1}{2}$ - $\frac{5}{8}$	4.00	$3\frac{1}{2}$	$1\frac{1}{8}$	1	9.10
2	$\frac{3}{4}$	$\frac{1}{2}$ - $\frac{5}{8}$	4.40	$3\frac{1}{2}$	$1\frac{1}{4}$	1	9.10
$2\frac{1}{2}$	$\frac{1}{2}$	$\frac{7}{8}$	4.40	4	$1\frac{1}{4}$	$\frac{7}{8}$ -1	11.10
$2\frac{1}{2}$	$\frac{3}{4}$	$\frac{7}{8}$	4.90	4	$1\frac{1}{2}$	1	12.00
$2\frac{1}{2}$	1	$\frac{7}{8}$	5.30	5	$1\frac{1}{2}$	1	12.70
$2\frac{3}{4}$	$\frac{1}{2}$	$\frac{7}{8}$	4.60	5	$1\frac{3}{4}$	1	13.80
$2\frac{3}{4}$	$\frac{3}{4}$	$\frac{7}{8}$	5.30	6	$1\frac{7}{8}$	$1\frac{1}{4}$ - $1\frac{1}{2}$	17.30
$2\frac{3}{4}$	1	$\frac{7}{8}$	5.60	7	$2\frac{1}{4}$	$1\frac{1}{4}$	34.50
3	$\frac{1}{2}$	1	4.90	8	$2\frac{3}{4}$	$1\frac{1}{4}$ - $1\frac{1}{2}$	46.00
3	$\frac{3}{4}$	1	6.00				

These Cutters are made in two parts and can be readily adjusted for maintaining a standard width of slot. Unless otherwise ordered the two parts are furnished.

## No. 126 L.

## MILLING CUTTERS

WITH RADIAL GROOVES.



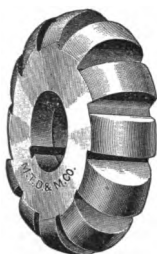
The above cut represents a Spiral Milling Cutter, with radial grooves cut opposite each other in alternate teeth. Such cutters give greater space for oil and greater ease in milling and are recommended for heavy milling.

Diam. of Cutter Inches.	Width of Face, Inches.	Diameter of Hole, Inches.	Price Each.	Diam. of Cutter, Inches.	Width of Face, Inches.	Diameter of Hole, Inches.	Price Each.
2½	2½	1	\$4.90	3½	4	1¼	\$11.00
2½	2¾	1	5.15	3½	5	1¼	12.50
2½	3	1	5.40	3½	6	1¼	14.25
2½	3½	1	6.00	4	2½	1¼-1½	10.00
2½	4	1	6.60	4	3	1¼-1½	10.80
2¾	4	1¼	7.20	4	3½	1¼-1½	12.00
2¾	6	1¼	12.00	4	4	1¼-1½	13.20
3	2½	1¼	6.25	4	5	1¼-1½	16.20
3	3	1¼	6.50	4	6	1¼-1½	18.60
3	3½	1¼	7.10	4½	2½	1¾-2	11.50
3	4	1¼	7.70	4½	3	1¾-2	12.75
3	5	1¼	9.40	4½	3½	1¾-2	14.25
3	6	1¼	13.00	4½	4	1¾-2	15.75
3½	2½	1¼	8.25	4½	5	1¾-2	18.75
3½	3	1¼	8.90	4½	6	1¾-2	22.25
3½	3½	1¼	9.80				

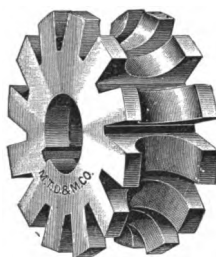
For sizes of Keyways, see appendix, page xxii.



**No. 126 C.**  
**CONVEX AND CONCAVE MILLING CUTTERS**  
 FOR MILLING HALF CIRCLES.



CONVEX.



CONCAVE.

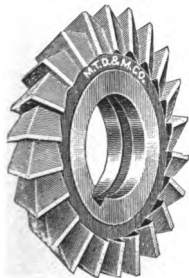
THESE CUTTERS CAN BE SHARPENED WITHOUT CHANGING THEIR FORM.

Diam. of Circle, Inches.	Diam. of Cutter, Inches.	Diam. of Hole, Inches.	Convex Cutter, Price Each.	Concave Cutter, Price Each.	Diam. of Circle, Inches.	Diam. of Cutter, Inches.	Diam. of Hole, Inches.	Convex Cutter, Price Each.	Concave Cutter, Price Each.
$\frac{1}{8}$	2	$\frac{7}{8}$	\$2.00	\$2.40	$\frac{3}{4}$	3	1	\$4.40	\$5.25
$\frac{3}{16}$	2	$\frac{7}{8}$	2.25	2.70	$\frac{7}{8}$	$3\frac{1}{4}$	1	4.80	5.75
$\frac{1}{4}$	2	$\frac{7}{8}$	2.50	3.00	1	$3\frac{1}{4}$	1	5.25	6.30
$\frac{5}{16}$	$2\frac{1}{4}$	$\frac{7}{8}$	2.80	3.35	$1\frac{1}{8}$	$3\frac{1}{2}$	1	5.75	6.90
$\frac{3}{8}$	$2\frac{1}{4}$	$\frac{7}{8}$	3.10	3.70	$1\frac{1}{4}$	$3\frac{1}{2}$	1	6.25	7.50
$\frac{7}{16}$	$2\frac{1}{4}$	$\frac{7}{8}$	3.35	4.00	$1\frac{3}{8}$	$3\frac{3}{4}$	1	7.00	8.40
$\frac{1}{2}$	$2\frac{1}{4}$	$\frac{7}{8}$	3.60	4.30	$1\frac{1}{2}$	$3\frac{3}{4}$	1	7.75	9.30
$\frac{5}{8}$	$2\frac{3}{4}$	1	4.00	4.80					

**No. 126 D.**

**CUTTERS FOR SPIRAL MILLS.**

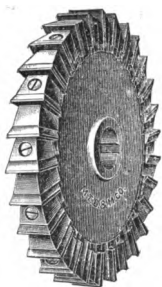
These Cutters have an angle of 40°, 48°, or 53°, with 12° the reverse side. They are carried in stock, both right and left hand, and when properly set will relieve themselves and cut smoothly.



**RIGHT HAND**  
**CUTTER.**

Diameter Inches.	Price Each.	Thickness, Inches.	Diam. of Hole, Inches.
$2\frac{1}{2}$	\$2.65	$\frac{1}{2}$	$\frac{7}{8}$
$2\frac{3}{4}$	2.80	$\frac{1}{2}$	1
3	3.35	$\frac{1}{2}$	$1\frac{1}{4}$
$3\frac{1}{4}$	3.75	$\frac{1}{2}$	$1\frac{1}{2}$

For 126 E, 126½ E, 126 F, 126½ F, 126½ G, 123½ H, 125½ I, see pages 287-292.

**No. 126 J.****SIDE MILLING CUTTERS****WITH INSERTED TEETH.**

Diameter Cutter, Inches.	Width of Face, Inches.	Diameter of Hole, Inches.	Price Each.
6	2	1 1/4	\$21.25
7	2	1 1/4	25.00
8	2	1 1/2	27.50
9	2	1 1/2	30.00
10	2	1 1/2	32.50

Other sizes furnished to order at special prices.

For 126 1/4 J see page 293.

**No. 126 K.****ANGULAR CUTTERS****AND CUTTERS FOR SPIRAL MILLS.****FORMED CUTTER.****RIGHT HAND CUTTER.**

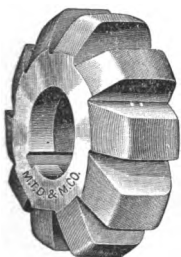
These Cutters are of the same dimensions as Cutters for Spiral Mills, No. 126 D, page 277.

They are made to order and can be sharpened by grinding without changing their form. Prices furnished on application.

For 126 L see page 276.

**No. 126 M.****SPROCKET WHEEL CUTTERS FOR BLOCK****CENTER CHAINS.**

Sprocket Wheel Cutters furnished to order for the usual 1 inch pitch chain. The cutters are of the most approved form for the purpose required, and can be so made as to cut two teeth at once. In ordering, give the number of teeth of sprocket.



No. of Teeth of Sprocket.	Diameter of Cutter, Inches.	Hole in Cutter, Inches.	Price Single Cutter.
6	2 <sup>3</sup> / <sub>4</sub>	1	\$6.00
7	2 <sup>3</sup> / <sub>4</sub>	1	6.00
8	2 <sup>3</sup> / <sub>4</sub>	1	6.00
9	2 <sup>3</sup> / <sub>4</sub>	1	6.00
10 and 11	2 <sup>3</sup> / <sub>4</sub>	1	6.00
12 and 13	2 <sup>3</sup> / <sub>4</sub>	1	6.00
14 to 16	2 <sup>3</sup> / <sub>4</sub>	1	6.00
17 to 20	2 <sup>3</sup> / <sub>4</sub>	1	6.00
21 and over	2 <sup>3</sup> / <sub>4</sub>	1	6.00

**CUTTERS FOR BLOCK CENTER CHAINS.**

Circular Pitch, Inches.	Thickness of Block, Inches.	Diameter Cutter, Inches.	Center to Center of Block, Inches.	Hole in Cutter, Inches.	Price Each.
1 <sup>1</sup> / <sub>16</sub>	.4375	3 <sup>1</sup> / <sub>2</sub>	.5313	1 <sup>1</sup> / <sub>4</sub>	\$7.50
1 <sup>1</sup> / <sub>2</sub>	<sup>1</sup> / <sub>2</sub>	3 <sup>3</sup> / <sub>4</sub>	.5625	1 <sup>1</sup> / <sub>4</sub>	8.00

Seven Cutters are made for each pitch, for Nos. of teeth as follows: 8, 9, 10 and 12 and 13, 14 to 16, 17 to 20, 21 and over.

**No. 126 M-A.****SPROCKET WHEEL CUTTERS FOR ROLLER CHAINS**

Circular Pitch, Inches.	Diameter of Rolls, Inches.	Diam. of Cutter, Inches.	Hole in Cutter, Inches.	Price Each.
<sup>1</sup> / <sub>2</sub>	.306 or .308	2 <sup>7</sup> / <sub>8</sub>	1	\$6.00
<sup>5</sup> / <sub>8</sub>	.401	3	1	6.25
<sup>3</sup> / <sub>4</sub>	*.47	3	1	6.50
<sup>1</sup> / <sub>8</sub>	.5625	3 <sup>3</sup> / <sub>8</sub>	1	7.00
1	.5625 or *.625	3 <sup>3</sup> / <sub>8</sub>	1	7.00
1 <sup>1</sup> / <sub>4</sub>	.625 or *.750	3 <sup>3</sup> / <sub>4</sub>	1 <sup>1</sup> / <sub>4</sub>	7.50
1 <sup>1</sup> / <sub>2</sub>	.75 or *.875	4	1 <sup>1</sup> / <sub>4</sub>	8.00
1 <sup>3</sup> / <sub>4</sub>	*1	4 <sup>1</sup> / <sub>2</sub>	1 <sup>1</sup> / <sub>4</sub>	10.00
2	*1.125	5	1 <sup>1</sup> / <sub>4</sub>	12.00

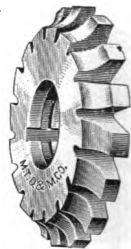
In ordering, specify the number of teeth in the sprocket, and the diameter of the roller  
 \*"Whitney Standard."

**No. 126 N.****CORNER ROUNDING CUTTERS.**

**SINGLE  
RIGHT HAND.**



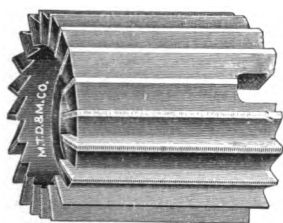
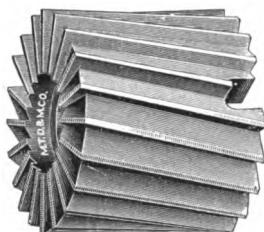
**DOUBLE  
RIGHT AND LEFT HAND.**



**SINGLE  
LEFT HAND.**

Radius of Circle, Inches.	Diameter of Cutter, Inches.	Diameter of Hole, Inches.	Single Cutter, Price Each.	Double Cutter, Price Each.
$\frac{1}{16}$	2	$\frac{7}{8}$	\$2.00	\$2.40
$\frac{3}{32}$	2	$\frac{7}{8}$	2.25	2.70
$\frac{1}{8}$	2	$\frac{7}{8}$	2.50	3.00
$\frac{5}{32}$	$2\frac{1}{4}$	$\frac{7}{8}$	2.70	3.35
$\frac{3}{16}$	$2\frac{1}{4}$	$\frac{7}{8}$	2.90	3.70
$\frac{7}{32}$	$2\frac{1}{4}$	$\frac{7}{8}$	3.10	4.00
$\frac{1}{4}$	$2\frac{1}{4}$	$\frac{7}{8}$	3.30	4.30
$\frac{5}{16}$	$2\frac{3}{4}$	1	3.50	4.80
$\frac{3}{8}$	3	1	3.70	5.25
$\frac{7}{16}$	$3\frac{1}{4}$	1	3.90	5.75
$\frac{1}{2}$	$3\frac{1}{4}$	1	4.20	6.30
$\frac{9}{16}$	$3\frac{1}{2}$	1	4.50	6.90
$\frac{5}{8}$	$3\frac{1}{2}$	1	5.00	7.50
$\frac{11}{16}$	$3\frac{3}{4}$	1	5.75	8.40
$\frac{3}{4}$	$3\frac{3}{4}$	1	6.50	9.30

The Cutters have side and radial clearance, and can be sharpened by grinding without changing their form. In ordering single Cutters, state whether Right or Left hand is wanted.

**No. 126 P.****SHELL END MILLS****WITH STRAIGHT FLUTES.****RIGHT HAND MILL.****No. 126½ P.****SHELL END MILLS****WITH SPIRAL FLUTES.****LEFT HAND MILL.****IN ORDERING, STATE WHETHER RIGHT OR LEFT HAND MILLS ARE WANTED.**

Diam. Inches.	Length of Cut, Inches.	Diameter of Hole, Inches.	Price Each.	Diam. Inches.	Length of Cut, Inches.	Diameter of Hole, Inches.	Price Each.
1 ¼	1 ¼	½	\$2.80	2 ¾	1 ¾	¾	\$4.50
1 ⅝	1 ¼	½	2.90	2 ¾	2 ¼	1	4.90
1 ¾	1 ¼	½	3.00	2 ¾	2 ¼	1	4.95
1 ⅞	1 ¼	½	3.10	2 ¾	2 ¼	1	5.00
1 ½	1 ¼	½	3.20	2 ¾	2 ¼	1	5.05
1 ⅞	1 ¾	¾	3.90	2 ½	2 ¼	1	5.10
1 5/8	1 ¾	¾	3.95	2 ⅞	2 ¼	1	5.20
1 11/8	1 ¾	¾	4.00	2 5/8	2 ¼	1	5.35
1 ¾	1 ¾	¾	4.05	2 11/8	2 ¼	1	5.50
1 13/8	1 ¾	¾	4.10	2 3/4	2 ¼	1	5.65
1 7/8	1 ¾	¾	4.15	2 13/8	2 ¼	1	5.80
1 15/8	1 ¾	¾	4.20	2 7/8	2 ¼	1	5.95
2	1 ¾	¾	4.30	2 15/8	2 ¼	1	6.10
2 1/8	1 ¾	¾	4.35	3	2 ¼	1	6.30
2 1/8	1 ¾	¾	4.40				

**These Mills can be furnished with threaded holes. Prices furnished on application. When ordering give size of thread and state whether V or U. S. Standard is required.**

## No. 126 R. ANGULAR CUTTERS

WITH THE SIDE GROUND CONCAVE  
RIGHT AND LEFT HAND.



LEFT  
HAND  
CUTTER.

Diameter, Inches.	Price Each.	Thickness, Inches.	Diameter of Hole, Inches.
2½	\$2.65	½	⅞
2¾	2.80	½	1
3	3.35	½	1¼
3¼	3.75	½	1½

These Cutters are carried in stock, both right and left hand, with angles of 45°, 50°, 60°, 70° and 80°. In ordering state whether Cutter is to be Right or Left Hand.

## No. 126 S. CUTTERS WITH DOUBLE ANGLE.



Diameter, Inches.	Price Each.	Thickness, Inches.	Diameter of Hole, Inches.
2½	\$2.65	½	⅞
2¾	2.80	½	1
3	3.35	½	1¼

These Cutters are carried in stock as illustrated with the included angle of either 45°, 60° or 90°.

## No. 126 T. FORMED CUTTERS WITH DOUBLE ANGLE.



These Cutters are of the same dimensions as Cutters 126 S. They are made to order and can be sharpened by grinding without changing their form. Prices furnished on application.



**No. 131.**  
**SCREW**  
**SLOTING**  
**CUTTERS.**



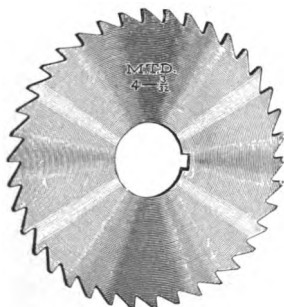
Number of Gauge.	Price Each.	Thickness in Decimals of 1 inch.	Diameter of Cutter, Inches.	Diameter of Hole, Inches.
5	\$ .70	.182	2 $\frac{3}{4}$	1
6	.60	.162	2 $\frac{3}{4}$	1
7	.50	.144	2 $\frac{3}{4}$	1
8	.45	.128	2 $\frac{3}{4}$	$\frac{3}{4}$ —1
9	.40	.114	2 $\frac{3}{4}$	$\frac{3}{4}$ —1
10	.35	.102	2 $\frac{3}{4}$	$\frac{3}{4}$ —1
11	.30	.091	2 $\frac{3}{4}$	$\frac{3}{4}$ —1
12	.25	.081	2 $\frac{3}{4}$	$\frac{3}{4}$ —1
13	.20	.072	2 $\frac{3}{4}$	$\frac{3}{4}$ —1
14	.20	.064	2 $\frac{3}{4}$	$\frac{1}{2}$ , $\frac{5}{8}$ , $\frac{3}{4}$ , 1
15	.15	.057	2 $\frac{3}{4}$	$\frac{1}{2}$ , $\frac{5}{8}$ , $\frac{3}{4}$ , 1
16	.15	.051	2 $\frac{3}{4}$	$\frac{1}{2}$ , $\frac{5}{8}$ , $\frac{3}{4}$ , 1
17	.15	.045	2 $\frac{3}{4}$	$\frac{1}{2}$ , $\frac{5}{8}$ , $\frac{3}{4}$ , 1
18	.15	.040	2 $\frac{3}{4}$	$\frac{1}{2}$ , $\frac{5}{8}$ , $\frac{3}{4}$ , 1
19	.15	.035	2 $\frac{3}{4}$	$\frac{1}{2}$ , $\frac{5}{8}$ , $\frac{3}{4}$ , 1
20	.15	.032	2 $\frac{3}{4}$	$\frac{1}{2}$ , $\frac{5}{8}$ , $\frac{3}{4}$ , 1
21	.15	.028	2 $\frac{3}{4}$	$\frac{1}{2}$ , $\frac{5}{8}$ , $\frac{3}{4}$ , 1
22	.15	.025	2 $\frac{3}{4}$	$\frac{1}{2}$ , $\frac{5}{8}$ , $\frac{3}{4}$ , 1
23	.15	.023	2 $\frac{3}{4}$	$\frac{1}{2}$ , $\frac{5}{8}$ , $\frac{3}{4}$ , 1
24	.15	.020	2 $\frac{3}{4}$	$\frac{1}{2}$ , $\frac{5}{8}$ , $\frac{3}{4}$ , 1
25	.15	.018	2 $\frac{3}{4}$	$\frac{1}{2}$ , $\frac{5}{8}$ , $\frac{3}{4}$ , 1
26	.15	.016	2 $\frac{3}{4}$	$\frac{1}{2}$ , $\frac{5}{8}$ , $\frac{3}{4}$ , 1
27	.15	.014	2 $\frac{3}{4}$	$\frac{1}{2}$ , $\frac{5}{8}$ , $\frac{3}{4}$ , 1
28	.15	.012	2 $\frac{3}{4}$	$\frac{1}{2}$ , $\frac{5}{8}$ , $\frac{3}{4}$ , 1

## No. 131.

## SCREW SLOTTING CUTTERS.

Number of Gauge.	Price Each.	Thickness in Decimals of 1 Inch.	Diameter of Cutter, Inches.	Diameter of Hole, Inches.
30	\$ .15	.010	$2\frac{3}{4}$	$\frac{1}{2}, \frac{5}{8}, \frac{3}{4}, 1$
32	.15	.008	$2\frac{3}{4}$	$\frac{1}{2}, \frac{5}{8}, \frac{3}{4}, 1$
34	.15	.006	$2\frac{3}{4}$	$\frac{1}{2}, \frac{5}{8}, \frac{3}{4}, 1$
20	.15	.032	$2\frac{1}{4}$	$\frac{1}{2}, \frac{5}{8}, \frac{3}{4}$
21	.15	.028	$2\frac{1}{4}$	$\frac{1}{2}, \frac{5}{8}, \frac{3}{4}$
22	.15	.025	$2\frac{1}{4}$	$\frac{1}{2}, \frac{5}{8}, \frac{3}{4}$
23	.15	.023	$2\frac{1}{4}$	$\frac{1}{2}, \frac{5}{8}, \frac{3}{4}$
24	.15	.020	$2\frac{1}{4}$	$\frac{1}{2}, \frac{5}{8}, \frac{3}{4}$
25	.15	.018	$2\frac{1}{4}$	$\frac{1}{2}, \frac{5}{8}, \frac{3}{4}$
26	.15	.016	$2\frac{1}{4}$	$\frac{1}{2}, \frac{5}{8}, \frac{3}{4}$
27	.15	.014	$2\frac{1}{4}$	$\frac{1}{2}, \frac{5}{8}, \frac{3}{4}$
28	.15	.012	$2\frac{1}{4}$	$\frac{1}{2}, \frac{5}{8}, \frac{3}{4}$
30	.15	.010	$2\frac{1}{4}$	$\frac{1}{2}, \frac{5}{8}, \frac{3}{4}$
32	.15	.008	$2\frac{1}{4}$	$\frac{1}{2}, \frac{5}{8}, \frac{3}{4}$
34	.15	.006	$2\frac{1}{4}$	$\frac{1}{2}, \frac{5}{8}, \frac{3}{4}$
14	.15	.064	$1\frac{3}{4}$	$\frac{5}{8}$
15	.15	.057	$1\frac{3}{4}$	$\frac{5}{8}$
16	.15	.051	$1\frac{3}{4}$	$\frac{5}{8}$
17	.15	.045	$1\frac{3}{4}$	$\frac{5}{8}$
18	.15	.040	$1\frac{3}{4}$	$\frac{5}{8}$
19	.15	.035	$1\frac{3}{4}$	$\frac{5}{8}$
20	.15	.032	$1\frac{3}{4}$	$\frac{5}{8}$
21	.15	.028	$1\frac{3}{4}$	$\frac{5}{8}$
22	.15	.025	$1\frac{3}{4}$	$\frac{5}{8}$
23	.15	.023	$1\frac{3}{4}$	$\frac{5}{8}$
24	.12	.020	$1\frac{3}{4}$	$\frac{3}{8}, \frac{1}{2}, \frac{5}{8}$
25	.12	.018	$1\frac{3}{4}$	$\frac{3}{8}, \frac{1}{2}, \frac{5}{8}$
26	.12	.016	$1\frac{3}{4}$	$\frac{3}{8}, \frac{1}{2}, \frac{5}{8}$
27	.12	.014	$1\frac{3}{4}$	$\frac{3}{8}, \frac{1}{2}, \frac{5}{8}$
28	.12	.012	$1\frac{3}{4}$	$\frac{3}{8}, \frac{1}{2}, \frac{5}{8}$
30	.12	.010	$1\frac{3}{4}$	$\frac{3}{8}, \frac{1}{2}, \frac{5}{8}$
32	.12	.008	$1\frac{3}{4}$	$\frac{3}{8}, \frac{1}{2}, \frac{5}{8}$
34	.12	.006	$1\frac{3}{4}$	$\frac{3}{8}, \frac{1}{2}, \frac{5}{8}$

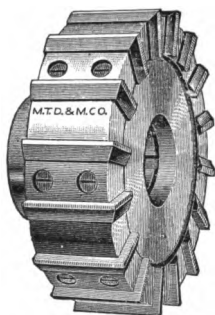




**No. 132.**  
**METAL SLITTING**  
**SAWS.**

Diam. Inches.	Width of Face, Inches.	Diameter of Hole, Inches.	Price Each.	Diam. Inches.	Width of Face, Inches.	Diameter of Hole, Inches.	Price Each.
2 1/2	3/32	7/8	\$1.00	4	3/32	1	\$1.20
2 1/2	3/64	7/8	.95	4	1/8	1	1.20
2 1/2	1/16	7/8	.90	4	3/32	1	1.40
2 1/2	3/32	7/8	.90	4	1/16	1	1.60
2 1/2	1/8	7/8	.90	5	1/8	1	1.80
2 1/2	5/32	7/8	1.10	5	3/32	1	1.50
2 1/2	1/32	1	1.00	5	1/8	1	1.50
2 1/2	3/64	1	1.00	5	1/8	1 1/4	1.50
2 1/2	1/16	1	.90	5	1/8	1 1/2	1.50
2 1/2	3/32	1	.90	5	3/32	1	1.90
2 1/2	1/8	1	.90	5	1/16	1	2.30
2 1/2	5/32	1	1.10	6	1/8	1	4.00
3	1/32	1	1.25	6	3/32	1	3.00
3	3/64	1	1.10	6	1/8	1	2.70
3	1/16	1	1.00	6	1/16	1	3.50
3	3/32	1	1.00	6	1/16	1 1/2	3.50
3	1/8	1	1.00	7	1/16	1	7.50
3	5/32	1	1.15	7	3/32	1	4.50
4	1/32	1	2.25	7	1/8	1	3.80
4	3/64	1	1.45	8	1/8	1	5.75
4	1/16	1	1.25				

All these saws have holes ground to standard size, and the sides are ground with a proper clearance to allow the cutting of deep slots.



**No. 126 Y.**  
**FACE MILLING CUTTERS**  
**WITH INSERTED TEETH.**

Diameter, Inches.	Width of Face, Inches.	Number of Taper Hole.	Price Each.	Diameter, Inches.	Width of Face, Inches.	Number of Taper Hole.	Price Each.
5½	2	10	\$15.00	7½	2	12	\$20.00
5½	2	12	15.00	8½	2⅜	12	22.50
6½	2	10	17.50	9½	2⅜	12	25.00
6½	2	12	17.50				

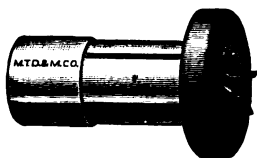
The body of this Cutter is of cast iron, has a taper-hole and key way and is held firmly on the arbor by a screw. The teeth are of tool steel, hardened and are adjustable.  
 In ordering state whether Right or Left Hand Cutters are wanted.  
 Other sizes made to order at special prices.  
 For Arbors to be used with these Cutters see page 155.

**No. 126 ½ A.**  
**STRAIGHT SHANK END MILLS**



Diameter, Inches.	Price Each.	Length Cut, Inches.	Whole Length, Inches.	Diameter, Inches.	Price Each.	Length Cut, Inches.	Whole Length, Inches.
⅛	\$ .35	⅜	1¼	⅜	\$ .80	⅞	2
⅜	.45	⅝	1½	⅞	1.00	1½	2½
¼	.55	11⁄8	1⅞	½	1.25	1	2¼
⅝	.70	7⁄8	1½	⅝	1.50	1⅞	2⅞

## No. 126 E. ADJUSTABLE HOLLOW MILLS.



Diam. of Hole, Inches.	Price Each.	Diameter of Shank, Inches.	Whole Length, Inches.	Diam. of Hole, Inches.	Price Each.	Diameter of Shank, Inches.	Whole Length, Inches.
$\frac{3}{32}$	\$1.60	$\frac{5}{8}$	$1\frac{1}{2}$	$\frac{7}{16}$	\$2.00	$\frac{3}{4}$	2
$\frac{1}{8}$	1.60	$\frac{5}{8}$	$1\frac{1}{2}$	$\frac{1}{2}$	2.20	1	$2\frac{1}{4}$
$\frac{5}{32}$	1.60	$\frac{5}{8}$	$1\frac{1}{2}$	$\frac{9}{16}$	2.40	1	$2\frac{1}{4}$
$\frac{3}{16}$	1.60	$\frac{5}{8}$	$1\frac{1}{2}$	$\frac{5}{8}$	2.60	1	$2\frac{1}{4}$
$\frac{7}{32}$	1.60	$\frac{5}{8}$	$1\frac{1}{2}$	$\frac{11}{16}$	2.80	$1\frac{1}{4}$	$2\frac{1}{2}$
$\frac{1}{4}$	1.60	$\frac{5}{8}$	$1\frac{1}{2}$	$\frac{13}{16}$	3.00	$1\frac{1}{4}$	$2\frac{1}{2}$
$\frac{9}{32}$	1.80	$\frac{3}{4}$	2	$\frac{3}{4}$	3.20	$1\frac{1}{4}$	$2\frac{1}{2}$
$\frac{5}{16}$	1.80	$\frac{3}{4}$	2	$\frac{15}{16}$	3.40	$1\frac{1}{2}$	$2\frac{3}{4}$
$\frac{11}{32}$	1.80	$\frac{3}{4}$	2	$\frac{7}{8}$	3.60	$1\frac{1}{2}$	$2\frac{3}{4}$
$\frac{3}{8}$	2.00	$\frac{3}{4}$	2	$\frac{15}{16}$	3.80	$1\frac{1}{2}$	$2\frac{3}{4}$
				1			

The holes in these Mills are carefully ground to size, and have a proper relief. Forcing the Ring on the Mill will correct any slight wear

## No. 126½ E. HOLLOW MILLS.

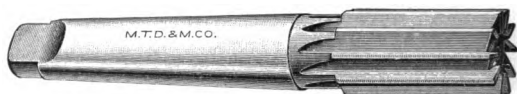


Diam. of Hole, Inches.	Price Each.	Outside Diameter, Inches.	Whole Length, Inches.	Diam. of Hole, Inches.	Price Each.	Outside Diameter, Inches.	Whole Length, Inches.
$\frac{3}{32}$	\$1.00	$\frac{5}{8}$	$1\frac{1}{2}$	$\frac{3}{8}$	\$2.00	1	$1\frac{3}{4}$
$\frac{1}{8}$	1.00	$\frac{5}{8}$	$1\frac{1}{2}$	$\frac{1}{4}$	2.00	1	$1\frac{3}{4}$
$\frac{5}{32}$	1.00	$\frac{5}{8}$	$1\frac{1}{2}$	$\frac{1}{2}$	2.00	1	$1\frac{3}{4}$
$\frac{3}{16}$	1.00	$\frac{5}{8}$	$1\frac{1}{2}$	$\frac{5}{8}$	2.00	$1\frac{1}{4}$	2
$\frac{7}{32}$	1.00	$\frac{5}{8}$	$1\frac{1}{2}$	$\frac{11}{16}$	2.00	$1\frac{1}{4}$	2
$\frac{1}{4}$	1.00	$\frac{5}{8}$	$1\frac{1}{2}$	$\frac{13}{16}$	2.50	$1\frac{1}{2}$	2
$\frac{9}{32}$	1.50	$\frac{3}{4}$	$1\frac{1}{2}$	$\frac{3}{4}$	2.50	$1\frac{1}{2}$	2
$\frac{5}{16}$	1.50	$\frac{3}{4}$	$1\frac{1}{2}$	$\frac{7}{8}$	2.50	$1\frac{3}{4}$	$2\frac{1}{4}$
$\frac{11}{32}$	1.50	$\frac{3}{4}$	$1\frac{1}{2}$	1	2.50	$1\frac{3}{4}$	$2\frac{1}{4}$

## No. 126 F.

## END MILLS

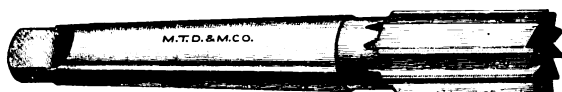
WITH MORSE TAPER SHANKS



## LEFT HAND MILL.

Diam., Inches.	Price Each.	Whole Length, Inches.	Length of Flutes Inches.	Morse Taper Shank, Number	Diam., Inches.	Price Each.	Whole Length, Inches.	Length of Flutes Inches.	Morse Taper Shank, Number
$\frac{1}{4}$	1.15	$3\frac{5}{8}$	$\frac{13}{16}$	1	1	2.30	$6\frac{3}{16}$	$1\frac{7}{8}$	3
$\frac{5}{16}$	1.15	$3\frac{11}{16}$	$\frac{7}{8}$	1	$1\frac{1}{16}$	2.15	$5\frac{3}{8}$	$1\frac{7}{8}$	2
$\frac{3}{8}$	1.20	$3\frac{11}{16}$	$\frac{7}{8}$	1	$1\frac{1}{16}$	2.30	$6\frac{3}{16}$	$1\frac{7}{8}$	3
$\frac{7}{16}$	1.25	$3\frac{3}{4}$	$\frac{1}{2}$	1	$1\frac{1}{8}$	2.35	$6\frac{5}{16}$	2	3
$\frac{7}{16}$	1.40	$4\frac{1}{2}$	1	2	$1\frac{3}{16}$	2.40	$6\frac{5}{16}$	2	3
$\frac{1}{2}$	1.30	$3\frac{11}{16}$	1	1	$1\frac{1}{4}$	2.45	$6\frac{5}{16}$	2	3
$\frac{1}{2}$	1.45	$4\frac{5}{8}$	$1\frac{1}{8}$	2	$1\frac{1}{4}$	2.55	$7\frac{3}{8}$	2	4
$\frac{9}{16}$	1.35	$3\frac{7}{8}$	$1\frac{1}{16}$	1	$1\frac{5}{16}$	2.65	$6\frac{7}{16}$	$2\frac{1}{8}$	3
$\frac{9}{16}$	1.50	$4\frac{3}{4}$	$1\frac{1}{4}$	2	$1\frac{5}{16}$	2.75	$7\frac{1}{2}$	$2\frac{1}{8}$	4
$\frac{5}{8}$	1.55	5	$1\frac{1}{2}$	2	$1\frac{3}{8}$	2.65	$6\frac{7}{16}$	$2\frac{1}{8}$	3
$\frac{11}{16}$	1.75	5	$1\frac{1}{2}$	2	$1\frac{3}{8}$	2.75	$7\frac{1}{2}$	$2\frac{1}{8}$	4
$\frac{3}{4}$	1.80	$5\frac{1}{8}$	$1\frac{5}{8}$	2	$1\frac{7}{16}$	2.75	$6\frac{9}{16}$	$2\frac{1}{4}$	3
$\frac{3}{4}$	1.95	$5\frac{1}{8}$	$1\frac{5}{8}$	3	$1\frac{7}{16}$	3.00	$7\frac{5}{8}$	$2\frac{1}{4}$	4
$\frac{13}{16}$	1.90	$5\frac{1}{8}$	$1\frac{5}{8}$	2	$1\frac{1}{2}$	2.75	$6\frac{9}{16}$	$2\frac{1}{4}$	3
$\frac{13}{16}$	2.00	$5\frac{1}{8}$	$1\frac{5}{8}$	3	$1\frac{1}{2}$	3.00	$7\frac{5}{8}$	$2\frac{1}{4}$	4
$\frac{7}{8}$	2.10	$5\frac{1}{4}$	$1\frac{3}{4}$	2	$1\frac{5}{8}$	3.25	$7\frac{3}{4}$	$2\frac{3}{8}$	4
$\frac{7}{8}$	2.25	$6\frac{1}{16}$	$1\frac{3}{4}$	3	$1\frac{3}{4}$	3.50	$7\frac{3}{4}$	$2\frac{3}{8}$	4
$\frac{15}{16}$	2.10	$5\frac{1}{4}$	$1\frac{3}{4}$	2	$1\frac{7}{8}$	3.75	$7\frac{7}{8}$	$2\frac{1}{2}$	4
$\frac{15}{16}$	2.25	$6\frac{1}{16}$	$1\frac{3}{4}$	3	2	4.00	$7\frac{7}{8}$	$2\frac{1}{2}$	4
1	2.15	$5\frac{3}{8}$	$1\frac{7}{8}$	2					

End Mills with shanks other than listed made to order at special prices. Right and Left Hand Mills carried in stock. In ordering state which is wanted.

**No. 126½ F.****END MILLS****WITH BROWN & SHARPE TAPER SHANKS.****LEFT HAND MILL.**

Diam. Inches.	Price Each.	Whole Length Inches.	Length of Flutes Inches.	Number of Shank.	Diam. Inches.	Price Each.	Whole Length Inches.	Length of Flutes Inches.	Number of Shank.
¼	\$1.00	2 7/8	1 1/8	4	7/8	\$2.10	5 3/4	1 3/4	7
¼	1.15	3	1 1/8	5	7/8	2.25	7	1 3/4	9
5/16	1.00	2 1/2	7/8	4	1 1/8	2.10	5 3/4	1 3/4	7
5/16	1.15	3 1/8	7/8	5	1 1/8	2.25	7	1 3/4	9
3/8	1.10	2 1/2	7/8	4	1	2.15	5 7/8	1 7/8	7
3/8	1.20	3 1/8	7/8	5	1	2.30	7 1/8	1 7/8	9
7/16	1.10	2 1/8	1 1/8	4	1 1/8	2.15	5 7/8	1 7/8	7
7/16	1.25	3 3/8	1 1/8	5	1 1/8	2.35	7 1/8	1 7/8	9
1/2	1.30	3 3/8	1	5	1 1/8	2.25	6	2	7
1/2	1.45	5 1/8	1 1/8	7	1 1/8	2.40	7 1/4	2	9
9/16	1.35	3 1/4	1 1/8	5	1 3/16	2.25	6	2	7
9/16	1.50	5 1/4	1 1/4	7	1 3/16	2.50	7 1/4	2	9
5/8	1.45	3 7/8	1 1/4	5	1 1/4	2.25	6	2	7
5/8	1.70	5 1/2	1 1/2	7	1 1/4	2.55	7 1/4	2	9
1 1/8	1.75	5 1/2	1 1/2	7	1 5/8	2.75	7 3/8	2 1/8	9
1 1/8	1.90	6 3/4	1 1/2	9	1 3/8	2.75	7 3/8	2 1/8	9
3/4	1.80	5 5/8	1 5/8	7	1 7/8	3.00	7 1/2	2 1/4	9
3/4	1.95	6 7/8	1 5/8	9	1 1/2	3.00	7 1/2	2 1/4	9
1 1/8	1.90	5 5/8	1 5/8	7	1 5/8	3.25	7 5/8	2 3/8	9
1 1/8	2.00	6 7/8	1 5/8	9	1 3/4	3.50	7 3/4	2 1/2	9

End Mills with shanks other than listed made to order at special prices. Right and Left Hand Mills carried in stock. In ordering state which is wanted.

No. 126½ G.

## END MILLS WITH SPIRAL FLUTES

WITH MORSE TAPER SHANKS.



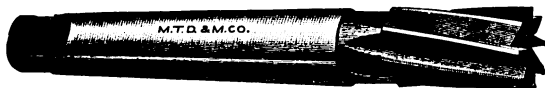
## LEFT HAND MILL.

In ordering state whether Right or Left Hand is wanted.

Diam., Inches.	Price Each.	Whole Length, Inches.	Length of Flutes Inches.	Morse Taper Shank, Number	Diam., Inches.	Price Each.	Whole Length, Inches.	Length of Flutes Inches.	Morse Taper Shank, Number
¼	1.15	3⅝	1⅜	1	1	2.30	6⅜	1⅞	3
⅕	1.15	3⅜	⅞	1	1⅕	2.15	5⅜	1⅞	2
⅜	1.20	3⅜	⅞	1	1⅕	2.30	6⅜	1⅞	3
⅞	1.25	3¾	1⅝	1	1⅞	2.35	6⅝	2	3
⅞	1.40	4½	1	2	1⅜	2.40	6⅝	2	3
½	1.30	3⅜	1	1	1¼	2.45	6⅝	2	3
½	1.45	4⅝	1⅞	2	1¼	2.55	7⅜	2	4
⅞	1.35	3⅞	1⅕	1	1⅞	2.65	6⅞	2⅞	3
⅞	1.50	4¾	1¼	2	1⅞	2.75	7½	2⅞	4
⅝	1.55	5	1½	2	1⅝	2.65	6⅞	2⅞	3
⅞	1.75	5	1½	2	1⅝	2.75	7½	2⅞	4
¾	1.80	5⅞	1⅝	2	1⅞	2.75	6⅞	2¼	3
¾	1.95	5⅜	1⅝	3	1⅞	3.00	7⅝	2¼	4
⅞	1.90	5⅞	1⅝	2	1½	2.75	6⅞	2¼	3
⅞	2.00	5⅜	1⅝	3	1½	3.00	7⅝	2¼	4
⅞	2.10	5¼	1¾	2	1⅝	3.25	7¾	2⅜	4
⅞	2.25	6⅞	1¾	3	1¾	3.50	7¾	2⅜	4
⅞	2.10	5¼	1¾	2	1⅞	3.75	7⅞	2½	4
⅞	2.25	6⅞	1¾	3	2	4.00	7⅞	2½	4
1	2.15	5⅝	1⅞	2					

End Mills with shanks other than listed made to order at special prices. Right and Left Hand Mills carried in stock.

**No. 126½ H.**  
**END MILLS WITH SPIRAL FLUTES**  
**WITH BROWN & SHARPE TAPER SHANKS.**

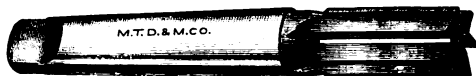


**LEFT HAND MILL.**

In ordering state whether Right or Left Hand is wanted.

Diameter, Inches.	Price Each.	Whole Length, Inches.	Length of Flutes, Inches.	Number of Shank.
1/4	\$1.00	2 7/8	1 1/8	4
1/4	1.15	3	1 1/8	5
5/16	1.00	2 1/2	7/8	4
5/16	1.15	3 1/8	7/8	5
3/8	1.10	2 1/2	7/8	4
3/8	1.20	3 1/8	7/8	5
7/16	1.10	2 9/16	1 1/8	4
7/16	1.25	3 1/8	1 1/8	5
1/2	1.30	3 7/8	1	5
1/2	1.45	5 1/8	1 1/8	7
9/16	1.35	3 1/4	1 7/16	5
9/16	1.50	5 1/4	1 1/4	7
5/8	1.45	3 7/8	1 1/4	5
5/8	1.70	5 1/2	1 1/2	7
1 1/16	1.75	5 1/2	1 1/2	7
1 1/16	1.90	6 3/4	1 1/2	9
3/4	1.80	5 5/8	1 5/8	7
3/4	1.95	6 7/8	1 5/8	9
13/16	1.90	5 5/8	1 5/8	7
13/16	2.00	6 7/8	1 5/8	9
7/8	2.10	5 3/4	1 3/4	7
7/8	2.25	7	1 3/4	9
1 1/8	2.10	5 3/4	1 3/4	7
1 1/8	2.25	7	1 3/4	9
1	2.15	5 7/8	1 7/8	7
1	2.30	7 1/8	1 7/8	9
1 1/16	2.15	5 7/8	1 7/8	7
1 1/16	2.35	7 1/8	1 7/8	9
1 1/16	2.25	6	2	7
1 1/8	2.40	7 1/4	2	9
1 1/8	2.25	6	2	7
1 1/8	2.50	7 1/4	2	9
1 1/4	2.25	6	2	7
1 1/4	2.55	7 1/4	2	9
1 1/8	2.75	7 3/8	2 1/8	9
1 3/8	2.75	7 3/8	2 1/8	9
1 7/16	3.00	7 1/2	2 1/4	9
1 1/2	3.00	7 1/2	2 1/4	9
1 5/8	3.25	7 5/8	2 3/8	9
1 3/4	3.50	7 3/4	2 1/2	9

**No. 126½ I.**  
**END MILLS WITH CENTER CUT**  
**WITH MORSE TAPER SHANKS.**



**LEFT HAND MILL.**

In ordering state whether Right or Left Hand is wanted.

Diameter, Inches.	Price Each.	Whole Length, Inches.	Length of Flutes, Inches.	Morse Taper Shank Number.
1/2	1.50	3 11/8	1	1
1/2	1.80	4 5/8	1 1/8	2
5/8	1.70	3 7/8	1 1/8	1
5/8	1.85	4 3/4	1 1/4	2
5/8	2.10	5	1 1/2	2
11/8	2.15	5	1 1/2	2
11/8	2.25	5 1/8	1 5/8	2
3/4	2.45	5 11/8	1 5/8	3
3/4	2.35	5 1/8	1 5/8	2
11/8	2.50	5 11/8	1 5/8	3
11/8	2.60	5 1/4	1 3/4	2
7/8	2.80	6 1/8	1 3/4	3
7/8	2.60	5 1/4	1 3/4	2
11/8	2.80	6 1/8	1 3/4	3
11/8	2.70	5 3/8	1 7/8	2
1	2.85	6 1/8	1 7/8	3
1	2.70	5 3/8	1 7/8	2
1 1/8	2.95	6 3/8	1 7/8	3
1 1/8	3.00	6 1/8	2	3
1 1/8	3.10	6 1/8	2	3
1 1/4	3.20	6 1/8	2	3
1 1/4	3.30	7 3/8	2	4
1 3/8	3.45	6 1/8	2 1/8	3
1 3/8	3.55	7 1/2	2 1/8	4
1 3/8	3.45	6 1/8	2 1/8	3
1 3/8	3.55	7 1/2	2 1/8	4
1 7/8	3.75	6 1/8	2 1/4	3
1 7/8	4.00	7 5/8	2 1/4	4
1 1/2	3.75	6 1/8	2 1/4	3
1 1/2	4.00	7 5/8	2 1/4	4

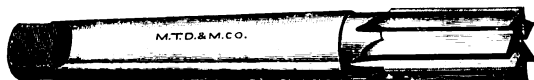
These mills are designed for use in cutting into the work with the end of the mill and then straight ahead as in the keyways. They can also be used to take heavy cuts.



## No. 126½ J.

## END MILLS WITH CENTER CUT

WITH BROWN &amp; SHARPE TAPER SHANKS.



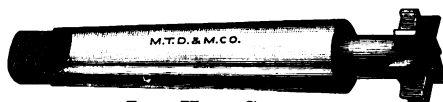
## LEFT HAND MILL.

In ordering state whether Right or Left Hand is wanted.

Diameter, Inches.	Price Each.	Whole Length, Inches.	Length of Flutes, Inches.	Number of Shank.
1/2	\$1.50	3 3/8	1	5
1/2	1.80	5 1/8	1 1/8	7
9/16	1.70	3 1/4	1 1/8	5
9/16	1.85	5 1/4	1 1/4	7
5/8	1.80	3 7/8	1 1/4	5
5/8	2.10	5 1/2	1 1/2	7
11/8	2.15	5 1/2	1 1/2	7
1 1/8	2.35	6 3/4	1 1/2	9
1 1/8	2.25	5 5/8	1 5/8	7
3/4	2.45	6 7/8	1 5/8	9
3/4	2.35	5 5/8	1 5/8	7
1 1/8	2.50	6 7/8	1 5/8	9
1 1/8	2.60	5 3/4	1 3/4	7
7/8	2.80	7	1 3/4	9
1 1/8	2.60	5 3/4	1 3/4	7
1 1/8	2.80	7	1 3/4	9
1	2.70	5 7/8	1 7/8	7
1	2.85	7 1/8	1 7/8	9
1 1/8	2.70	5 7/8	1 7/8	7
1 1/8	2.95	7 1/8	1 7/8	9
1 1/8	2.80	6	2	7
1 1/8	3.00	7 1/4	2	9
1 1/8	2.80	6	2	7
1 3/8	3.10	7 1/4	2	9
1 1/4	2.80	6	2	7
1 1/4	3.20	7 1/4	2	9
1 5/8	3.45	7 3/8	2 1/8	9
1 3/8	3.45	7 3/8	2 1/8	9
1 7/8	3.75	7 1/2	2 1/4	9
1 1/2	3.75	7 1/2	2 1/4	9

These mills are designed for use in cutting into the work with the end of the mill and then straight ahead as in keyways. They can also be used to take heavy cuts.

**No. 126 V.**  
**T SLOT CUTTERS**  
**WITH MORSE TAPER SHANKS.**



**LEFT HAND CUTTER.**

In ordering state whether Right or Left Hand is wanted.

Diameter, Inches.	Price Each.	Thickness, Inches.	Diameter of Neck, Inches.	Whole Length, Inches.	Length of Neck, Inches.	Number of Shank.
$\frac{1}{2}$	\$1.65	$\frac{5}{32}$	$\frac{7}{32}$	$3\frac{1}{8}$	$\frac{1}{4}$	1
$\frac{5}{8}$	1.95	$\frac{3}{16}$	$\frac{9}{32}$	$3\frac{1}{8}$	$\frac{5}{16}$	1
$\frac{11}{16}$	2.15	$\frac{7}{32}$	$\frac{11}{32}$	$3\frac{3}{8}$	$\frac{3}{8}$	2
$\frac{13}{16}$	2.50	$\frac{7}{32}$	$\frac{3}{8}$	$3\frac{1}{8}$	$\frac{1}{2}$	2
$\frac{15}{16}$	2.75	$\frac{9}{32}$	$\frac{7}{16}$	$4\frac{1}{2}$	$\frac{1}{2}$	2
$1\frac{1}{16}$	3.25	$\frac{11}{32}$	$\frac{17}{32}$	$5\frac{3}{4}$	$\frac{5}{8}$	3
$1\frac{1}{8}$	3.60	$\frac{13}{32}$	$\frac{19}{32}$	$5\frac{1}{2}$	$\frac{1}{2}$	3
$1\frac{3}{8}$	3.90	$\frac{15}{32}$	$\frac{21}{32}$	$6\frac{1}{2}$	$1\frac{1}{8}$	4
$1\frac{1}{2}$	4.15	$\frac{17}{32}$	$\frac{23}{32}$	$7\frac{1}{2}$	$1\frac{1}{4}$	4

**No. 126 W.**  
**T SLOT CUTTERS**  
**WITH BROWN & SHARPE TAPER SHANKS**



**LEFT HAND CUTTER.**

In ordering state whether Right or Left Hand is wanted.

Diameter, Inches.	Price Each.	Thickness, Inches.	Diameter of Neck, Inches.	Whole Length, Inches.	Length of Neck, Inches.	Number of Shank.
$\frac{1}{2}$	\$1.50	$\frac{5}{32}$	$\frac{7}{32}$	$1\frac{7}{8}$	$\frac{1}{4}$	4
$\frac{1}{2}$	1.60	$\frac{5}{32}$	$\frac{7}{32}$	$2\frac{3}{8}$	$\frac{1}{4}$	5
$\frac{5}{8}$	1.80	$\frac{3}{16}$	$\frac{9}{32}$	$2\frac{1}{8}$	$\frac{5}{16}$	5
$\frac{5}{8}$	2.10	$\frac{5}{32}$	$\frac{11}{32}$	$4\frac{1}{4}$	$\frac{5}{16}$	5
$\frac{11}{16}$	2.00	$\frac{7}{32}$	$\frac{13}{32}$	$2\frac{5}{8}$	$\frac{3}{8}$	7
$\frac{11}{16}$	2.20	$\frac{7}{32}$	$\frac{11}{32}$	$4\frac{7}{8}$	$\frac{3}{8}$	7
$\frac{13}{16}$	2.35	$\frac{9}{32}$	$\frac{3}{8}$	$4\frac{1}{2}$	$\frac{1}{2}$	7
$\frac{13}{16}$	2.50	$\frac{7}{32}$	$\frac{3}{8}$	$5\frac{5}{8}$	$\frac{1}{2}$	9
$\frac{15}{16}$	2.60	$\frac{9}{32}$	$\frac{7}{16}$	$4\frac{1}{2}$	$\frac{1}{2}$	7
$\frac{15}{16}$	2.80	$\frac{11}{32}$	$\frac{9}{16}$	$5\frac{3}{4}$	$1\frac{1}{2}$	9
$1\frac{1}{16}$	3.10	$\frac{13}{32}$	$\frac{17}{32}$	$6\frac{1}{2}$	$\frac{5}{8}$	9
$1\frac{1}{8}$	3.45	$\frac{15}{32}$	$\frac{19}{32}$	$6\frac{1}{2}$	$\frac{1}{2}$	9
$1\frac{3}{8}$	3.75	$\frac{17}{32}$	$\frac{21}{32}$	$6\frac{3}{4}$	$1\frac{1}{8}$	9
$1\frac{1}{2}$	4.00	$\frac{19}{32}$	$\frac{23}{32}$	$6\frac{3}{4}$	$1\frac{1}{4}$	9

T Slot Cutters have diameters  $\frac{1}{16}$  inch larger than sizes given above to allow for sharpening.

# **No. 126½ L.** **COTTER MILLS**

WITH MORSE TAPER SHANKS.



Diam., Inches.	Price Each.	Whole Length, Inches.	Length of Body, Inches.	Morse Taper Shank.	Diam., Inches.	Price Each.	Whole Length, Inches.	Length of Body, Inches.	Morse Taper Shank.
¼	\$2.60	3½	1¼	No. 1.	½	\$3.35	6	2⅞	No. 3.
⅝	2.70	4⅞	1½		⅞	3.45	6⅜	2⅝	
⅜	2.80	4¼	1⅞		⅝	3.55	6⅜	2½	
⅞	2.90	4⅞	1⅞		⅞	3.65	6⅜	2½	
⅜	2.95	4⅞	1⅞	No. 2.	¾	3.80	6⅜	2½	
⅞	3.05	5	1⅞		⅞	3.95	6⅜	2½	
½	3.15	5¼	2⅞		⅞	4.10	6⅜	2½	
⅞	3.25	5⅞	2⅝		⅞	4.25	6⅜	2½	
⅝	3.35	5⅝	2½		1	4.40	6⅜	2½	

# **No. 126½ M.** **COTTER MILLS**

WITH BROWN & SHARPE TAPER SHANKS.

Diam., Inches.	Price Each.	Whole Length, Inches.	Length of Body, Inches.	No. of Shank.	Diam., Inches.	Price Each.	Whole Length, Inches.	Length of Body, Inches.	No. of Shank.
¼	\$2.60	3⅞	1¼	No. 5.	½	\$3.35	6⅞	2⅞	No. 9.
⅝	2.70	3⅞	1½		⅞	3.45	7⅞	2⅝	
⅜	2.80	3⅞	1⅞		⅝	3.55	7⅞	2½	
⅞	2.90	3¾	1⅞		⅞	3.65	7⅞	2½	
⅜	2.95	5⅞	1⅞	No. 7.	¾	3.80	7⅞	2½	
⅞	3.05	5⅞	1⅞		⅞	3.95	7⅞	2½	
½	3.15	5⅞	2⅞		⅞	4.10	7⅞	2½	
⅞	3.25	6	2⅝		⅞	4.25	7⅞	2½	
⅝	3.35	6⅜	2½		1	4.40	7⅞	2½	

## INVOLUTE CUTTERS

## FOR THE TEETH OF GEAR WHEELS.

These cutters can be sharpened by grinding the faces of the teeth. To preserve the form of the cutter care must be used in grinding to keep the face of each tooth radial.

To cut a set of interchangeable wheels with theoretical accuracy, as many cutters would be required as there are different wheels in the set, for the reason that, strictly speaking, the shape of the teeth should vary with every change in the number of teeth in the wheels. As this change of form is slight and becomes less with each increase in the number of teeth, it has been found that a set of wheels ranging from a pinion of twelve teeth to a rack can be cut with sufficient accuracy for most purposes by the use of eight cutters, as follows:—

No. 1 will cut wheels from 135 teeth to a rack.

No. 2 will cut wheels from 55 teeth to 134 teeth.

No. 3 will cut wheels from 35 teeth to 54 teeth.

No. 4 will cut wheels from 26 teeth to 34 teeth.

No. 5 will cut wheels from 21 teeth to 25 teeth.

No. 6 will cut wheels from 17 teeth to 20 teeth.

No. 7 will cut wheels from 14 teeth to 16 teeth.

No. 8 will cut wheels from 12 teeth to 13 teeth.

When greater accuracy in the shape of the teeth is desired, we are prepared to furnish to order, either cutters specially adapted to any given number of teeth, or for use with the regular set above, cutters in half numbers as follows:—

No. of Cutter.	Range.	No. of Cutter.	Range.
$1\frac{1}{2}$	80 to 134 teeth.	$5\frac{1}{2}$	19 to 20 teeth.
$2\frac{1}{2}$	42 to 54 teeth.	$6\frac{1}{2}$	15 to 16 teeth.
$3\frac{1}{2}$	30 to 34 teeth.	$7\frac{1}{2}$	13 teeth
$4\frac{1}{2}$	23 to 25 teeth.		

Each cutter is marked with its number, also the diametral pitch and number of teeth for which it is adapted. In ordering, give number of cutter and diametral pitch required.

TABLE SHOWING DEPTH OF SPACE AND THICKNESS OF TOOTH IN SPUR WHEELS WHEN CUT WITH THESE CUTTERS.

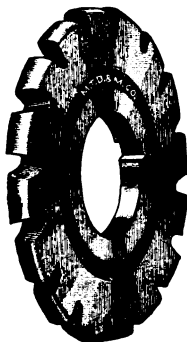
Pitch of Cutter.	Depth to be Cut in Gear, Inches.	Thickness of Tooth at Pitch Line, Inches.	Pitch of Cutter.	Depth to be Cut in Gear, Inches.	Thickness of Tooth at Pitch Line, Inches.
$1\frac{1}{4}$	1.726	1.257	$2\frac{1}{2}$	.863	.628
$1\frac{1}{2}$	1.438	1.047	$2\frac{3}{4}$	.784	.570
$1\frac{3}{4}$	1.233	.898	3	.719	.523
2	1.078	.785	$3\frac{1}{2}$	.616	.448
$2\frac{1}{4}$	.958	.697	4	.539	.393

Continued on next page.

TABLE SHOWING DEPTH OF SPACE AND THICKNESS OF TOOTH IN SPUR  
WHEELS WHEN CUT WITH THESE CUTTERS.

(CONTINUED.)

Pitch of Cutter.	Depth to be Cut in Gear, Inches.	Thickness of Tooth at Pitch Line, Inches.	Pitch of Cutter.	Depth to be Cut in Gear, Inches.	Thickness of Tooth at Pitch Line, Inches.
5	.431	.314	20	.108	.079
6	.359	.262	22	.098	.071
7	.308	.224	24	.090	.065
8	.270	.196	26	.083	.060
9	.240	.175	28	.077	.056
10	.216	.157	30	.072	.052
11	.196	.143	32	.067	.049
12	.180	.131	36	.060	.044
14	.154	.112	40	.054	.039
16	.135	.098	48	.045	.033
18	.120	.087			



No. 131 A.

STOCKING CUTTERS

FOR

INVOLUTE GEARS.

Diametral Pitch.	Price Each.	Diam. of Cutter, Inches.	Diam. of Hole, Inches.	Diametral Pitch.	Price Each.	Diam. of Cutter, Inches.	Diam. Hole, Inches.
*1 1/4	\$19.20	7 1/4	1 1/2	*3 1/2	\$3.75	3 5/8	1 1/4
*1 1/2	14.40	6 1/2	1 1/2	*3 3/4	3.60	3 1/2	1 1/4
*1 3/4	11.10	5 3/4	1 1/2	4	3.30	3 3/8	1 1/4
2	7.50	5	1 1/4	*4 1/2	3.00	3 1/4	1 1/4
*2 1/4	6.75	4 1/2	1 1/4	5	2.70	3 1/8	1 1/4
2 1/2	6.00	4 1/4	1 1/4	*5 1/2	2.50	2 7/8	1 1/4
*2 3/4	5.40	4	1 1/4	6	2.35	2 3/4	1 1/8
3	4.20	3 7/8	1 1/4	7	2.20	2 5/8	1 1/8
*3 1/4	3.90	3 3/4	1 1/4	8	2.05	2 1/2	1 1/8

Cutters marked \* are made to order.

For No. 131 B see page 300; 131 C, 305.

For sizes of Keyways, see Appendix, page xxii.

# STOCKING CUTTERS FOR INVOLUTE GEARS.

**No. 131D.****No. 131E.**

WITH 1 INCH HOLE				WITH 1 1/4 INCH HOLE			
Diametral Pitch.	Price Each.	Diam. of Cutter Inches.	Diam. of Hole, Inches.	Diametral Pitch.	Price Each.	Diam. of Cutter, Inches.	Diam. of Hole, Inches.
4	\$3.30	3 1/2	1	3	\$4.50	4 1/4	1 1/4
*4 1/2	3.00	3 3/8	1	*3 1/2	4.05	4	1 1/4
5	2.70	3 1/4	1	4	3.60	3 3/4	1 1/4
*5 1/2	2.50	3 1/8	1	*4 1/2	3.30	3 3/4	1 1/4
6	2.35	3	1	5	3.15	3 5/8	1 1/4
7	2.20	2 7/8	1	*5 1/2	3.00	3 5/8	1 1/4
8	2.05	2 7/8	1	6	2.85	3 1/2	1 1/4
				7	2.70	3 3/8	1 1/4
				8	2.55	3 1/4	1 1/4

Cutters marked \* are made to order.  
For sizes of Keyways, see Appendix, page xxii.

# STOCKING CUTTERS FOR INVOLUTE GEARS.

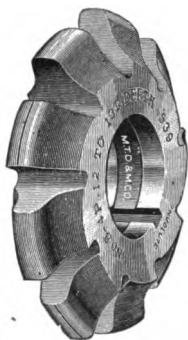
**No. 131 F.****No. 131 G.**

WITH 1½ INCH HOLE				WITH 1¾ INCH HOLE			
Diametral Pitch.	Price Each.	Diam. of Cutter, Inches.	Diam. of Hole, Inches.	Diametral Pitch.	Price Each.	Diam. of Cutter, Inches.	Diam. of Hole, Inches.
2	\$8.10	5¾	1½	*1¾	\$11.10	6½	1¾
*2¼	7.35	5½	1½	2	8.40	6¼	1¾
2½	6.30	5	1½	*2¼	7.65	6	1¾
*2¾	5.70	4¾	1½	2½	6.60	5¾	1¾
3	4.80	4¾	1½	*2¾	6.00	5½	1¾
*3¼	4.65	4½	1½	3	5.10	5¼	1¾
*3½	4.35	4¾	1½	*3¼	4.95	5½	1¾
*3¾	4.05	4¼	1½	*3½	4.65	4¾	1¾
4	3.75	4¼	1½	*3¾	4.35	4¾	1¾
*4½	3.45	4½	1½	4	4.05	4¾	1¾
5	3.15	4	1½	*4½	3.75	4½	1¾
*5½	3.00	3¾	1½	5	3.45	4¾	1¾
6	2.85	3¾	1½	*5½	3.45	4¾	1¾
7	2.70	3¾	1½	6	3.30	4¼	1¾
8	2.55	3½	1½	*7	3.15	4½	1¾
				*8	3.00	4	1¾

Cutters marked \* are made to order.

For No. 131 H see page 301.

For sizes of Keyways, see Appendix, page xxii.

**No. 131 B.****INVOLUTE CUTTERS****FOR TEETH OF GEAR WHEELS.**

All gears of same pitch, cut with these cutters will interchange.

Diametral Pitch.	Price Each.	Diam. of Cutter, Inches.	Diam. of Hole, Inches.	Diametral Pitch.	Price Each.	Diam. of Cutter, Inches.	Diam. of Hole, Inches.
*1	\$45.00	8 1/2	2	14	\$2.70	2	7/8
*1 1/4	38.00	7 3/4	2	*15	2.60	2	7/8
*1 1/2	32.00	7	1 3/4	16	2.50	2	7/8
*1 3/4	24.00	6 1/2	1 3/4	18	2.40	1 7/8	7/8
2	16.00	5 3/4	1 1/2	20	2.30	1 7/8	7/8
*2 1/4	13.00	5 3/4	1 1/2	22	2.20	1 7/8	7/8
2 1/2	11.00	5 1/2	1 1/2	24	2.10	1 3/4	7/8
*2 3/4	10.00	5 1/8	1 1/2	26	2.00	1 3/4	7/8
3	8.00	4 3/8	1 1/4	28	1.80	1 3/4	7/8
*3 1/4	7.00	4 1/4	1 1/4	30	1.80	1 3/4	7/8
*3 1/2	6.75	4 1/8	1 1/4	32	1.80	1 3/4	7/8
*3 3/4	6.50	4	1 1/4	34	1.80	1 3/4	7/8
4	6.00	3 7/8	1 1/4	36	1.80	1 3/4	7/8
*4 1/2	5.50	3 3/4	1 1/4	*38	1.80	1 3/4	7/8
5	5.00	3 5/8	1 1/4	40	1.80	1 3/4	7/8
*5 1/2	5.00	3 5/8	1 1/4	*44	1.80	1 3/4	7/8
6	4.30	3	1	48	1.80	1 3/4	7/8
7	4.10	2 7/8	1	*50	1.80	1 3/4	7/8
8	3.90	2 7/8	1	*56	1.80	1 3/4	7/8
9	3.70	2 3/4	1	*60	1.80	1 3/4	7/8
10	3.50	2 1/4	7/8	*64	1.80	1 3/4	7/8
11	3.30	2 1/4	7/8	*70	1.80	1 3/4	7/8
12	3.10	2 1/8	7/8	*80	1.80	1 3/4	7/8
*13	2.90	2 1/8	7/8	*120	1.80	1 3/4	7/8

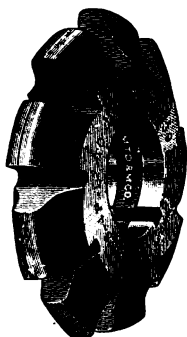
Eight Cutters made for each pitch, see page 296.

Cutters marked \* are made to order.

For No. 131 C see page 305; 131 D, 131 E, 298; 131 F, 131 G, 299.

For sizes of Keyways, see Appendix, page xxii.



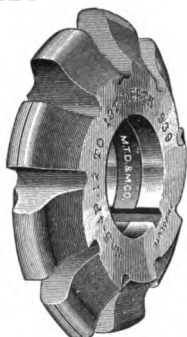


**No. 131 H.**  
**INVOLUTE CUTTERS**  
 FOR TEETH OF GEAR WHEELS.  
 LARGE DIAMETERS.

All gears of same pitch cut with these cutters will interchange.

Diametral Pitch.	Price Each.	Diam. of Cutter Inches.	Diam. of Hole, Inches.
*1	\$45.00	8½	1½-2
*1¼	38.00	7¾	1½-2
*1½	33.00	7¼	1½-2
*1¾	25.00	6¾	1½-2
2	16.50	6¼	1½-2
*2¼	13.50	6¼	1½-2
2½	12.00	6¼	1½-2
*2¾	10.50	5¾	1½-2
3	9.50	5¼	1½-2
4	8.00	5¼	1½-2
5	7.00	5¼	1½-2
6	5.80	4¼	1½-2
7	5.60	4¼	1½-2
8	5.40	4¼	1½-2
10	5.20	4¼	1½-2
12	4.35	4¼	1½-2
14	4.00	4¼	1½-2
16	4.00	4¼	1½-2

Cutters marked \* are made to order.  
 Eight cutters made for each pitch. see page 296.  
 For sizes of Keyways, see Appendix, page xxii.



## INVOLUTE CUTTERS

FOR TEETH OF GEAR WHEELS.

All gears of same pitch cut with these cutters  
will interchange.

## No. 131 J.

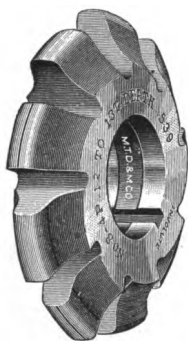
## No. 131 K.

WITH 1 INCH HOLE.				WITH 1 1/4 INCH HOLE.			
Diametral Pitch,	Price Each.	Diam. of Cutter Inches.	Diam. of Hole, Inches.	Diametral Pitch.	Price Each.	Diam. of Cutter, Inches.	Diam. of Hole, Inches.
4	\$5.50	3 1/2	1	3	\$8.00	4 3/8	1 1/4
*4 1/2	5.00	3 3/8	1	*3 1/4	7.00	4 1/4	1 1/4
5	4.75	3 1/4	1	*3 1/2	6.75	4 1/8	1 1/4
5 1/2	4.50	3 1/8	1	*3 3/4	6.50	4	1 1/4
6	4.30	3	1	4	6.00	3 7/8	1 1/4
7	4.10	2 7/8	1	*4 1/2	5.50	3 3/4	1 1/4
8	3.90	2 7/8	1	5	5.00	3 5/8	1 1/4
9	3.70	2 3/4	1	*5 1/2	5.00	3 5/8	1 1/4
10	3.60	2 3/4	1	6	4.80	3 1/2	1 1/4
11	3.50	2 5/8	1	7	4.60	3 3/8	1 1/4
12	3.35	2 5/8	1	8	4.40	3 1/4	1 1/4
*13	3.15	2 5/8	1	9	4.20	3 1/8	1 1/4
14	2.95	2 1/2	1	10	4.00	3	1 1/4
*15	2.85	2 1/2	1	11	3.80	2 7/8	1 1/4
16	2.75	2 1/2	1	12	3.60	2 7/8	1 1/4
18	2.65	2 3/8	1	*13	3.40	2 7/8	1 1/4
20	2.55	2 3/8	1	*14	3.20	2 7/8	1 1/4
22	2.45	2 1/4	1	*15	3.10	2 7/8	1 1/4
24	2.35	2 1/4	1	*16	3.00	2 7/8	1 1/4
*26	2.25	2 1/4	1	*18	2.90	2 7/8	1 1/4
*28	2.05	2 1/4	1	*20	2.80	2 3/4	1 1/4
*30	2.05	2 1/4	1				
*32	2.05	2 1/4	1				
*34	2.05	2 1/4	1				
*36	2.05	2 1/4	1				
*38	2.05	2 1/4	1				
*40	2.05	2 1/4	1				
*44	2.05	2 1/4	1				
*48	2.05	2 1/4	1				

Cutters marked \* are made to order.  
Eight cutters made for each pitch, see page 296.  
For sizes of Keyways, see Appendix, page xxii.

# INVOLUTE CUTTERS

## FOR TEETH OF GEAR WHEELS.



All gears of same pitch cut with these cutters will interchange.

**No. 131 L.**

**No. 131 M.**

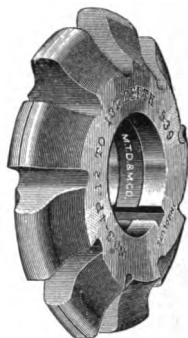
WITH 1½ INCH HOLE.				WITH 1¾ INCH HOLE.			
Diametral Pitch	Price Each.	Diam. of Cutter, Inches.	Diam. of Hole, Inches.	Diametral Pitch.	Price Each.	Diam. of Cutter, Inches.	Diam. of Hole, Inches.
2	\$16.00	5¾	1½	1¾	\$24.00	6½	1¾
*2¼	13.00	5¾	1½	2	17.00	6½	1¾
2½	11.00	5½	1½	*2¼	13.50	6¼	1¾
*2¾	10.00	5½	1½	2½	11.50	5⅞	1¾
3	9.00	5	1½	*2¾	10.50	5⅞	1¾
*3¼	8.00	4¾	1½	3	9.50	5⅞	1¾
*3½	7.50	4⅝	1½	*3¼	8.50	5¼	1¾
*3¾	7.00	4⅝	1½	*3½	7.75	5	1¾
4	6.50	4¼	1½	*3¾	7.50	4¾	1¾
*4½	6.00	4⅞	1½	4	7.00	4⅝	1¾
5	5.50	4	1½	*4½	6.50	4½	1¾
*5½	5.50	3⅞	1½	5	6.00	4⅝	1¾
6	5.30	3¾	1½	*5½	6.00	4⅝	1¾
7	5.10	3⅝	1½	6	5.80	4¼	1¾
8	4.90	3½	1½	*7	5.60	4⅞	1¾
*9	4.70	3½	1½	*8	5.40	4	1¾
*10	4.70	3½	1½				

Cutters marked \* are made to order.

Eight cutters made for each pitch, see page 296.

For sizes of Keyways, see Appendix, page xxii.

**No. 131 N.**  
**INVOLUTE GEAR CUTTERS CIRCULAR PITCH.**



Circular Pitch, Inches.	Price Each.	Diameter of Cutter, Inches.	Diameter of Hole, Inches.
$\frac{1}{8}$	\$2.60	$1\frac{3}{4}$	$\frac{7}{8}$
$\frac{3}{16}$	3.00	2	$\frac{7}{8}$
$\frac{1}{4}$	3.60	$2\frac{1}{8}$	$\frac{7}{8}$
$\frac{5}{16}$	4.00	$2\frac{1}{4}$	$\frac{7}{8}$
$\frac{3}{8}$	4.40	$2\frac{7}{8}$	1
$\frac{7}{16}$	4.60	$2\frac{7}{8}$	1
$\frac{1}{2}$	4.80	3	1
$\frac{9}{16}$	5.50	$3\frac{5}{8}$	$1\frac{1}{4}$
$\frac{5}{8}$	5.50	$3\frac{5}{8}$	$1\frac{1}{4}$
$\frac{11}{16}$	6.00	$3\frac{3}{4}$	$1\frac{1}{4}$
$\frac{3}{4}$	6.50	$3\frac{7}{8}$	$1\frac{1}{4}$
$\frac{13}{16}$	7.00	4	$1\frac{1}{4}$
$\frac{7}{8}$	7.25	$4\frac{1}{8}$	$1\frac{1}{4}$
$\frac{15}{16}$	7.50	$4\frac{1}{4}$	$1\frac{1}{4}$
1	8.50	$4\frac{3}{8}$	$1\frac{1}{4}$
$1\frac{1}{8}$	10.50	$5\frac{1}{8}$	$1\frac{1}{2}$
$1\frac{1}{4}$	11.50	$5\frac{1}{2}$	$1\frac{1}{2}$
$1\frac{3}{8}$	13.50	$5\frac{3}{4}$	$1\frac{1}{2}$
$1\frac{1}{2}$	16.50	$5\frac{3}{4}$	$1\frac{1}{2}$
$1\frac{3}{4}$	24.50	$6\frac{1}{2}$	$1\frac{3}{4}$
2	32.50	7	$1\frac{3}{4}$
$2\frac{1}{4}$	35.00	$7\frac{1}{2}$	$1\frac{3}{4}$
$2\frac{1}{2}$	38.50	$7\frac{3}{4}$	2
$2\frac{3}{4}$	42.00	$8\frac{1}{2}$	2
3	45.50	$8\frac{1}{2}$	2

For sizes of Keyways, see Appendix, page xxii.

## CUTTERS FOR MITRE AND BEVEL GEARS.

Mitre Gears are Bevel Gears having the same number of teeth and whose center lines intersect at right angles.

A pair of Mitre Gears can be cut with one cutter, but a pair of Bevel Gears that are not Mitres may require two cutters.

Cutters for Bevel Gears are of similar form to those for spur gears except for thickness, which must be no greater than the space between the teeth of the gear at their inside ends. As usually made cutters are thin enough to cut a gear whose tooth face is not longer than one-third the distance from the outer ends of the teeth to the point where the center lines of the gears intersect.

Eight cutters are made for each pitch. In cutting a Bevel Gear it is usually necessary to use a cutter of a shape adapted for a greater number of teeth than the number of teeth in the gear to be cut. The number of cutter for each gear of a pair may be found as follows: First, find the center angle of the larger gear by dividing the number of teeth in same by the number of teeth in the smaller gear; the result will be the tangent of the center angle which may be found by reference to a table of tangents. The number of teeth in the larger gear divided by the cosine of this center angle will give the number of teeth for which a cutter should be selected to cut the larger gear. The number of teeth in the smaller gear divided by the sine of this same center angle will give the number of teeth for which a cutter should be selected to cut the smaller gear. In the case of Mitre Gears, this is equivalent to multiplying the number of teeth in one of the gears by 1.41 and selecting a cutter for the number of teeth indicated by the product.

EXAMPLE: To select a cutter for mitres of 40 T, multiply 40 by 1.41. The product 56.4 shows that a cutter of shape No. 2 for 55 to 134 T, is the one required.

In ordering cutters for Bevel Gears, if the number of teeth in each gear, the pitch and length of face are given, also the angle of the shafts, we can select the proper cutters.

### No. 131 C.

## CUTTERS FOR MITRE AND BEVEL GEARS.

Diametral Pitch.	Price Each.	Diam. of Cutters, Inches.	Diam. of Hole, Inches.	Diametral Pitch.	Price Each.	Diam. of Cutter, Inches.	Diam. of Hole, Inches.
3	\$7.50	4	1 $\frac{1}{4}$	10	\$3.50	2 $\frac{1}{4}$	$\frac{7}{8}$
4	5.50	3 $\frac{1}{2}$	1 $\frac{1}{4}$	12	3.10	2 $\frac{1}{8}$	$\frac{7}{8}$
5	4.75	3 $\frac{1}{4}$	1 $\frac{1}{4}$	14	2.70	2	$\frac{7}{8}$
6	4.30	3	1	16	2.50	2	$\frac{7}{8}$
7	4.10	2 $\frac{7}{8}$	1	20	2.30	1 $\frac{7}{8}$	$\frac{7}{8}$
8	3.90	2 $\frac{3}{4}$	1	24	2.10	1 $\frac{3}{4}$	$\frac{7}{8}$

Eight cutters made for each pitch. See page 296.

Cutters for pitches not given in the above list will be made to order at special prices.

For No. 131 D see page 298.

## TABLES SHOWING THE CORRESPONDING DIAMETRAL AND CIRCULAR PITCHES.

No. 1 table shows the diametral pitches with the corresponding circular pitches.  
No. 2 table shows the circular pitches with the corresponding diametral pitches.

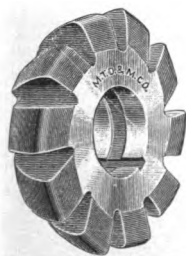
TABLE NO. 1.		TABLE NO. 2.	
Diametral Pitch.	Circular Pitch, Inches.	Circular Pitch, Inches.	Diametral Pitch.
$\frac{1}{2}$	6.283	6	.523
$\frac{3}{4}$	4.188	5	.628
1	3.141	4	.785
$1\frac{1}{4}$	2.513	$3\frac{1}{2}$	.897
$1\frac{1}{2}$	2.094	3	1.047
$1\frac{3}{4}$	1.795	$2\frac{3}{4}$	1.142
2	1.571	$2\frac{1}{2}$	1.256
$2\frac{1}{4}$	1.396	$2\frac{1}{4}$	1.396
$2\frac{1}{2}$	1.257	2	1.571
$2\frac{3}{4}$	1.142	$1\frac{7}{8}$	1.676
3	1.047	$1\frac{3}{4}$	1.795
$3\frac{1}{2}$	.898	$1\frac{5}{8}$	1.933
4	.785	$1\frac{1}{2}$	2.094
5	.628	$1\frac{7}{16}$	2.185
6	.524	$1\frac{3}{8}$	2.285
7	.449	$1\frac{1}{8}$	2.394
8	.393	$1\frac{1}{4}$	2.513
9	.349	$1\frac{3}{16}$	2.646
10	.314	$1\frac{1}{8}$	2.793
11	.286	$1\frac{1}{16}$	2.957
12	.262	1	3.142
14	.224	$\frac{15}{16}$	3.351
16	.196	$\frac{7}{8}$	3.590
18	.175	$\frac{11}{8}$	3.867
20	.157	$\frac{3}{4}$	4.189
22	.143	$\frac{11}{4}$	4.570
24	.131	$\frac{5}{8}$	5.027
26	.121	$\frac{1}{2}$	5.585
28	.112	$\frac{1}{2}$	6.283
30	.105	$\frac{1}{16}$	7.181
32	.098	$\frac{3}{8}$	8.378
36	.087	$\frac{1}{8}$	10.053
40	.079	$\frac{1}{4}$	12.566
48	.065	$\frac{1}{8}$	16.755
		$\frac{1}{8}$	25.133
		$\frac{1}{8}$	50.266

The diametral pitch of a gear is the number of teeth to each inch of its pitch diameter.  
The circular pitch is the distance from the center of one tooth to the center of the next tooth, measured along the pitch circle.

**No. 126 H.****CUTTERS FOR GROOVING TAPS.**

Cutter Number.	Diameter of Tap, Inches.	Diameter of Cutter, Inches.	Hole in Cutter, Inches.	Price Each.
1	0 to $\frac{1}{8}$	2	1	\$2.00
2	$\frac{5}{32}$ to $\frac{1}{4}$	2	1	2.10
3	$\frac{9}{32}$ to $\frac{3}{8}$	$2\frac{1}{8}$	1	2.20
4	$\frac{7}{16}$ to $\frac{5}{8}$	$2\frac{1}{4}$	1	2.40
5	$\frac{11}{16}$ to $\frac{7}{8}$	$2\frac{3}{8}$	1	2.40
6	$\frac{1}{2}$ to $1\frac{1}{4}$	$2\frac{1}{2}$	1	2.70
7	$1\frac{5}{16}$ to $1\frac{5}{8}$	$2\frac{5}{8}$	1	2.70
8	$1\frac{11}{16}$ to 2	$2\frac{7}{8}$	1	3.00
9	$2\frac{1}{16}$ to $2\frac{7}{16}$	$3\frac{1}{8}$	1	3.40
10	$2\frac{1}{2}$ to 3	$3\frac{3}{8}$	1	3.80

The above cutters are adapted for grooving taps only, and are not suitable for fluting reamers.

**No. 126 H-A.****CUTTERS FOR GROOVING REAMERS.**

Cutter Number.	Diameter of Reamer, Inches.	No. Teeth in Reamer.	Diameter of Cutter, Inches.	Hole in Cutter, Inches.	Price Each.
1	$\frac{1}{8}$ to $\frac{3}{16}$	6	2	1	\$2.00
2	$\frac{1}{4}$ to $\frac{5}{16}$	6	$2\frac{1}{8}$	1	2.10
3	$\frac{3}{8}$ to $\frac{7}{16}$	6	$2\frac{1}{4}$	1	2.20
4	$\frac{1}{2}$ to $\frac{11}{16}$	6 to 8	$2\frac{3}{8}$	1	2.40
5	$\frac{3}{4}$ to 1	8	$2\frac{1}{2}$	1	2.40
6	$1\frac{1}{16}$ to $1\frac{1}{2}$	10	$2\frac{1}{2}$	1	2.70
7	$1\frac{9}{16}$ to $2\frac{1}{8}$	12	$2\frac{5}{8}$	1	2.70
8	$2\frac{1}{4}$ to 3	14	$2\frac{5}{8}$	1	3.00
9	$3\frac{1}{16}$ to $3\frac{1}{2}$	14	$2\frac{3}{4}$	1	3.30
10	$3\frac{9}{16}$ to 5	14 to 16	$2\frac{3}{4}$	1	3.70

The above cutters are especially adapted for fluting reamers and have greater strength than those made for grooving both taps and reamers.

In ordering give number of cutter, or diameter and number of teeth of tap or reamer.

## No. 126 H-B.

### CUTTERS FOR GROOVING TAPS AND REAMERS.



Cutter Number.	Diameter of Tap, Inches.	No. Teeth in Tap.	Diameter of Cutter, Inches.	Hole in Cutter, Inches.	Price Each
1	0 to $\frac{1}{8}$	4	2	1	\$2.00
2	$\frac{5}{32}$ to $\frac{1}{4}$	4	2	1	2.10
3	$\frac{9}{32}$ to $\frac{3}{8}$	4	$2\frac{1}{8}$	1	2.20
4	$\frac{7}{16}$ to $\frac{5}{8}$	4	$2\frac{1}{4}$	1	2.40
5	$\frac{11}{16}$ to $\frac{7}{8}$	4	$2\frac{3}{8}$	1	2.40
6	$\frac{13}{16}$ to $1\frac{1}{4}$	4	$2\frac{1}{2}$	1	2.70
7	$1\frac{5}{16}$ to $1\frac{5}{8}$	4	$2\frac{5}{8}$	1	2.70
8	$1\frac{11}{16}$ to 2	4	$2\frac{7}{8}$	1	3.00

The Number 1 cutter is suitable for grooving taps  $\frac{1}{8}$ " or less diameter; Number 2 for Taps larger than  $\frac{1}{8}$ " and up to  $\frac{1}{4}$ " diameter, etc.

In ordering give number of cutter, or diameter and number of teeth of Tap.

These Cutters are also adapted for fluting reamers, for which purpose it is necessary only to cut one or more grooves of a less depth in order to flute unevenly. See table below.

### No. 126 H-C.

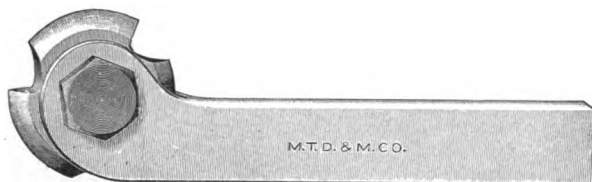
Cutter Number.	Diameter of Reamer, Inches.	No. Teeth in Reamer.	Diameter of Cutter, Inches.	Hole in Cutter, Inches.	Price Each.
1	$\frac{1}{8}$ to $\frac{1}{4}$	6	2	1	\$2.00
2	$\frac{3}{32}$ to $\frac{3}{8}$	6	2	1	2.10
3	$\frac{13}{32}$ to $\frac{1}{2}$	6	$2\frac{1}{8}$	1	2.20
4	$\frac{17}{32}$ to $1\frac{1}{8}$	6 to 8	$2\frac{1}{4}$	1	2.40
5	$1\frac{5}{32}$ to $1\frac{3}{4}$	8 to 10	$2\frac{3}{8}$	1	2.40
6	$1\frac{33}{32}$ to 2	10	$2\frac{1}{2}$	1	2.70

In ordering give number of cutter, or diameter and number of teeth of reamer.



## No. 130.

### LATHE THREADING TOOL.



Price, Holder . . \$1.00

Price, Cutter . . \$1.20

Size of Shank  $\frac{1}{2}$  inch by 1 inch.Whole length of holder  $6\frac{5}{8}$  inches.

If required for U. S. S. or Whitworth shape of threads, a different cutter is required for each pitch, and the pitch should be specified in ordering.

For V form of thread one cutter only is required.

When ordering specify form of thread to be cut.

## DIAMETER OF SPROCKET WHEELS.

FOR BLOCK CHAINS 1 INCH PITCH.

No. of Teeth	Pitch Diam. Inches	Outside Diam. Inches.	Bottom Diam. Inches.	No. of Teeth	Pitch Diam. Inches.	Outside Diam. Inches.	Bottom Diam. Inches.
6	1.935	2.260	1.610	19	6.056	6.381	5.731
7	2.250	2.575	1.925	20	6.374	6.699	6.040
8	2.566	2.891	2.241	21	6.692	7.017	6.367
9	2.882	3.207	2.557	22	7.010	7.335	6.685
10	3.198	3.523	2.873	23	7.328	7.653	7.003
11	3.515	3.840	3.190	24	7.646	7.971	7.321
12	3.832	4.157	3.507	25	7.964	8.289	7.639
13	4.149	4.474	3.824	26	8.282	8.607	7.957
14	4.466	4.791	4.141	27	8.600	8.925	8.275
15	4.784	5.109	4.459	28	8.918	9.243	8.593
16	5.102	5.427	4.777	29	9.237	9.562	8.912
17	5.420	5.745	5.095	30	9.556	9.881	9.231
18	5.738	6.063	5.413				

For list of Sprocket Wheel Cutters, see page 279.

**MORSE TWIST DRILL AND MACHINE COMPANY**  
**DISCOUNT SHEET**  
**TAP SECTION**

Pages 310 to 338 Inclusive

**DIES**

<b>BOLT DIES</b> Nos. 160, 161.....	.....
<b>PIPE DIES</b> No. 159.....	.....
<b>SCREW PLATE DIES</b> No. 152 (1, A, B, C, D, No. 152 (E).....	.....

**REAMERS**

**PIPE REAMERS**

No. 137 $\frac{1}{8}$ to $1\frac{1}{2}$ inches inclusive.....	.....
2 to 3 inches inclusive.....	.....
$3\frac{1}{2}$ to 4 inches inclusive.....	.....

**SCREW PLATES**

No. 151 (D) .....	.....
No. 151 (E) .....	.....
No. 153 (A, B, C) .....	.....
Nos. 154, 157, 158 .....	.....

**TAPS**

<b>BEAMAN &amp; SMITH TAPS</b> No. 143.....	.....
<b>BIT BRACE TAPS</b> No. 141 B.....	.....
<b>BLACKSMITHS' TAPER TAPS</b> No. 150.....	.....
<b>BOILER TAPS, STRAIGHT AND TAPER</b>	
No. 146 A $\frac{1}{2}$ to $1\frac{5}{16}$ inches inclusive.....	.....
$1\frac{3}{8}$ to 2 inches inclusive.....	.....
$2\frac{1}{8}$ to $2\frac{1}{2}$ inches inclusive.....	.....

**COMBINED PIPE TAPS AND DRILLS**

No. 133.....	.....
No. 133 A.....	.....

**HOB TAPS**

<b>HOB OR MASTER TAPS</b> No. 142.....	.....
<b>PIPE HOB TAPS</b>	
No. 136 D to 2 inches inclusive.....	.....
$2\frac{1}{2}$ to 3 inches inclusive.....	.....
$3\frac{1}{2}$ to 4 inches inclusive.....	.....
<b>SELLERS HOB TAPS</b> No. 145.....	.....
<b>SHORT PLUG HOB TAPS</b> No. 144.....	.....

# MORSE TWIST DRILL AND MACHINE COMPANY

## DISCOUNT SHEET

### TAP SECTION (CONTINUED.)

#### TAPS (continued)

##### MACHINE NUT TAPS

No. 139	to $1\frac{5}{16}$ inches inclusive	.....
	$1\frac{3}{8}$ to 2 inches inclusive	.....
	$2\frac{1}{8}$ to 3 inches inclusive	.....
	$3\frac{1}{8}$ to 4 inches inclusive	.....

##### MACHINE SCREW TAPS Nos. 140, 140 A .....

##### MACHINISTS' HAND TAPS

Nos. 138, 138 $\frac{1}{2}$	to $1\frac{5}{16}$ inches inclusive	.....
	$1\frac{3}{8}$ to 2 inches inclusive	.....
	$2\frac{1}{8}$ to 3 inches inclusive	.....
	$3\frac{1}{8}$ to 4 inches inclusive	.....

##### MUD PLUG OR WASHOUT TAPS No. 146 B .....

##### PATCH BOLT TAPS No. 146 to $1\frac{1}{4}$ inches .....

##### PIPE TAPS

No. 136	$\frac{1}{8}$ to $1\frac{1}{2}$ inches inclusive	.....
	2 to 3 inches inclusive	.....
	$3\frac{1}{2}$ to 4 inches inclusive	.....

##### No. 136 B ..... On application

No. 136C	$\frac{1}{8}$ to $1\frac{1}{2}$ inches inclusive	.....
	2 to 3 inches inclusive	.....
	$3\frac{1}{2}$ to 4 inches inclusive	.....

##### PULLEY TAPS No. 141 to 1 inch .....

##### SPINDLE STAY BOLT TAPS No. 149 $\frac{1}{2}$ .....

##### STAY BOLT TAPS No. 149 .....

##### STOVE BOLT TAPS No. 148 .....

##### TAPPER TAPS

No. 147	$\frac{1}{4}$ to $1\frac{5}{16}$ inches inclusive	.....
	$1\frac{3}{8}$ to $1\frac{1}{2}$ inches inclusive	.....

##### TAP WRENCHES

No. 155	.....
No. 156 (A, B, C)	.....
No. 156 (D)	.....
No. 156 (E, F)	.....

TAPS

## THE UNITED STATES STANDARD THREAD

We advise and strongly recommend the adoption and use of the United States Standard Thread for bolts and nuts, and for all screw threads where this is possible, using the U. S. form, with a greater number of threads per inch if desired for special work, as in the case of the A. L. A. M. Standard, thus entirely superseding the use of the sharp "V" and over size makeshifts.

The United States Standard thread is peculiarly adapted for interchangeable work, which is impossible with the sharp "V" and impracticable with any other known. It is simple in every element of its construction, reduces detail in shop practice, and tends to economy in cost of manufacture, as it does in cheapening cost of repairs. It brings order out of confusion, reduces the number of sizes and pitches, and consequently saves time, patience and money.

## IMPORTANT NOTICE

For many years this Company has advocated the adoption and use of the U. S. Standard form of thread instead of the V form. The United States Government, the railroads and many of the manufacturing interests of the country have adopted this Standard, and its use is rapidly extending to lines which have heretofore used the V form.

Looking forward to a time in the near future when we can discontinue the manufacture and listing of the V form of thread in Taps and Dies as a regular commercial product, we show in this catalogue under the several types of these tools additional pitches in the U. S. form of thread for use in that class of manufacture where finer threads than the standard are called for.

We also beg to call attention to the general movement among the manufacturers of Taps and Dies as well as among the Screw and Bolt manufacturers with a view of assisting in the universal adoption of the U. S. Standard form of thread. The several mechanical journals in February and March, 1909, published articles bearing on this movement.

## WHY WE RECOMMEND THE U. S. OR FRANKLIN INSTITUTE FORMULA

It is the Standard for all Government work.

It is the Standard for all railroads.

It has been adopted as the Standard by the various continental countries of Europe.

This is the only recognized form of thread in this country and it now covers Screws and Taps of all sizes.

All manufacturers of either Screws or Taps work to the same Gauges.

It is possible to obtain interchangeability in manufacture by its use, and impossible with any other form.

## WHY WE URGE THE DISCONTINUANCE OF V FORM

It is not a Standard.

Of the twelve or more manufacturers of V Thread Taps in this country no two work to the same size gauges.

Of all the manufacturers of V Thread Screws in this country, no two work to the same size gauges.

The continued use of the V Thread means extra expense, delays, non-interchangeable parts, confusion, waste.

Is there any ground for the continued use of the V form?

**No. 133 A.****COMBINED PIPE TAPS AND DRILLS**

FOR TAPPING GAS AND WATER PIPES UNDER  
PRESSURE WITH TAPPING MACHINES.

STANDARD TAPER  $\frac{3}{4}$  INCH TO THE FOOT.



Size, Inches.	Price Each.	Size, Inches.	Price Each.	Size, Inches.	Price Each.
$\frac{1}{4}$	\$3.00	$\frac{5}{8}$	\$4.50	$1\frac{1}{4}$	\$6.00
$\frac{3}{8}$	3.00	$\frac{3}{4}$	4.50	$1\frac{1}{2}$	7.00
$\frac{1}{2}$	4.00	1	5.00	2	8.00

ABOVE PRICES APPLY FOR LENGTHS GIVEN IN  
FOLLOWING TABLE.

Style Number.	Whole Length, Inches.	Diameter of Shank, Inches.	Size of Square.
1	$9\frac{3}{4}$	.831	$\frac{5}{8}$
2	$10\frac{3}{4}$	.831	$\frac{5}{8}$
3	$10\frac{3}{4}$	.831	$\frac{5}{8}$
4	13	.831	$\frac{5}{8}$
1 E	$13\frac{3}{4}$	.831	$\frac{5}{8}$
2 E	16	.935	$1\frac{1}{8}$

**FOR CORPORATION COCKS.**

Prices quoted on application.

Style Number.	Whole Length, Inches.	Diameter of Shank, Inches.	Size of Square.
$1\frac{1}{2}$ E	$15\frac{3}{4}$	.831	$\frac{5}{8}$
$2\frac{1}{2}$ E	$19\frac{3}{4}$	.935	$1\frac{1}{8}$

Numbers  $1\frac{1}{2}$  E and  $2\frac{1}{2}$  E are made of various tapers per foot. When writing for prices or in ordering, specify number, size and taper per foot.

Other sizes and styles furnished on receipt of order and sketch giving necessary data. Prices quoted on application.

**No. 133.**  
**COMBINED PIPE TAPS AND DRILLS**  
 FOR TAPPING GAS AND WATER PIPES.  
 STANDARD TAPER  $\frac{3}{4}$  INCH TO THE FOOT.



Size Inches.	Whole Length, Inches.	Price Each.
$\frac{1}{8}$	$3\frac{3}{4}$	\$1.50
$\frac{1}{4}$	$3\frac{1}{8}$	1.50
$\frac{3}{8}$	$4\frac{1}{8}$	1.75
$\frac{1}{2}$	$4\frac{1}{2}$	2.20
$\frac{3}{4}$	$4\frac{1}{4}$	3.00
1	$4\frac{1}{8}$	3.80
$1\frac{1}{4}$	$5\frac{1}{8}$	4.80
$1\frac{1}{2}$	$5\frac{7}{8}$	5.80
2	$6\frac{1}{4}$	7.60
$2\frac{1}{2}$	7	10.00
3	$7\frac{5}{8}$	15.00

Shanks for sizes  $\frac{1}{8}$  to  $1\frac{1}{2}$  inches are  $1\frac{1}{8}$  inch by  $\frac{1}{2}$  inch, and  $1\frac{7}{8}$  inches long.

Shanks for sizes 2 to 3 inches are 1 inch by  $\frac{3}{4}$  inch, and  $2\frac{3}{8}$  inches long.

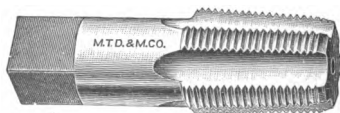
The above Tools furnished with special shanks fitting Pipe Tapping Machines on receipt of order and sketch giving necessary data. Prices quoted on application.

**TAPER PIPE TAPS AND REAMERS.**

BRIGGS STANDARD.

**No. 136.**

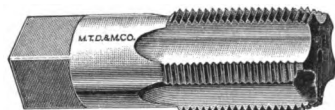
**No. 137.**



Left Hand Threads at regular prices.

Size Inches.	Price Each.	Threads Per Inch.	Size Inches.	Price Each.	Threads Per Inch.	Size Inches.	Price Each.	Threads Per Inch.
$\frac{1}{8}$	\$1.12	27	1	\$3.12	$11\frac{1}{2}$	$2\frac{1}{2}$	\$10.50	8
$\frac{1}{4}$	1.25	18	$1\frac{1}{4}$	3.75	$11\frac{1}{2}$	3	15.00	8
$\frac{3}{8}$	1.50	18	$1\frac{1}{2}$	4.62	$11\frac{1}{2}$	$3\frac{1}{2}$	22.00	8
$\frac{1}{2}$	1.87	14	2	6.25	$11\frac{1}{2}$	4	33.00	8
$\frac{3}{4}$	2.50	14						

Standard Taper is  $\frac{3}{4}$  inch to the foot. Pipe Taps larger than 3 inches, have inserted teeth Right Hand Threads always furnished unless Left Hand is specified on the order. For Tap Drills see appendix page XX.

**No. 136 B.****STRAIGHT PLUG PIPE TAPS.**

These Taps are furnished at same list as No. 136 and take same number threads, but special discount. They are plugged on entering end and are used for tapping out Lock Nuts or Straight Fittings. Outside diameters are  $\frac{1}{8}$  inch less than actual external diameter of wrought iron Steam and Gas Pipe.

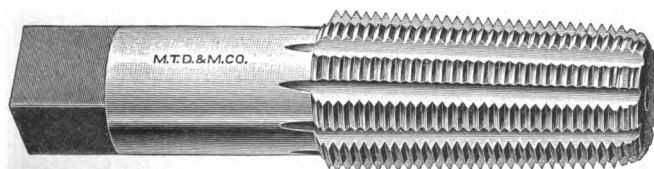
There is no recognized standard for outside diameter of these taps; if other than the above are desired send sample Nut or Fitting.

For list of No. 136 Pipe Taps see page 312.

For No. 136 C see page 314.

**No. 136 D.****PIPE HOB TAPS**

BRIGGS STANDARD.

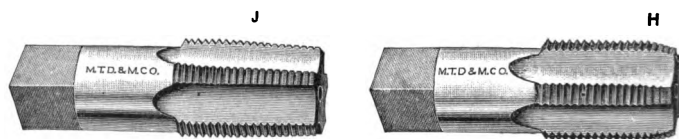


Left Hand Threads at regular prices.

Size Inches.	Price Each.	Threads per Inch.	Size Inches.	Price Each.	Threads per Inch.	Size Inches.	Price Each.	Threads per Inch.
$\frac{1}{8}$	\$1.12	27	1	\$3.12	11 $\frac{1}{2}$	2 $\frac{1}{2}$	\$10.50	8
$\frac{1}{4}$	1.25	18	1 $\frac{1}{4}$	3.75	11 $\frac{1}{2}$	3	15.00	8
$\frac{3}{8}$	1.50	18	1 $\frac{1}{2}$	4.62	11 $\frac{1}{2}$	3 $\frac{1}{2}$	22.00	8
$\frac{1}{2}$	1.87	14	2	6.25	11 $\frac{1}{2}$	4	33.00	8
$\frac{3}{4}$	2.50	14						

Right Hand Threads always furnished unless Left Hand is specified on the order.

# **No. 136 C.** **WHITWORTH PIPE TAPS.**



Size Inches.	Price Each.	Diameter of Threads, Inches.	Pitch.	Whole Length, Inches.	Taper "J" Inches.	Plug "H" Inches.	Length of Threads, Inches.
$\frac{1}{8}$	\$1.12	.385	28	$2\frac{1}{8}$	$\frac{5}{8}$	$\frac{3}{16}$	1
$\frac{1}{4}$	1.25	.521	19	$2\frac{1}{2}$	$\frac{3}{4}$	$\frac{3}{16}$	$1\frac{1}{3}$
$\frac{3}{8}$	1.50	.660	19	$2\frac{7}{8}$	$\frac{3}{4}$	$\frac{3}{16}$	$1\frac{1}{4}$
$\frac{1}{2}$	1.87	.830	14	$3\frac{1}{4}$	$\frac{7}{8}$	$\frac{1}{4}$	$1\frac{1}{2}$
$\frac{5}{8}$	2.50	.906	14	$3\frac{1}{4}$	1	$\frac{5}{16}$	$1\frac{5}{16}$
$\frac{3}{4}$	2.50	1.046	14	$3\frac{5}{8}$	$1\frac{1}{16}$	$\frac{5}{16}$	$1\frac{3}{8}$
$\frac{7}{8}$	3.12	1.195	14	$3\frac{5}{8}$	$1\frac{1}{16}$	$\frac{5}{16}$	$1\frac{3}{8}$
1	3.12	1.315	11	4	$1\frac{1}{8}$	$\frac{3}{8}$	$1\frac{3}{4}$
$1\frac{1}{8}$	3.75	1.498	11	$4\frac{1}{8}$	$1\frac{1}{8}$	$\frac{3}{8}$	$1\frac{3}{4}$
$1\frac{1}{4}$	3.75	1.656	11	$4\frac{3}{8}$	$1\frac{3}{16}$	$\frac{3}{8}$	$1\frac{7}{8}$
$1\frac{3}{8}$	4.62	1.751	11	$4\frac{1}{2}$	$1\frac{3}{16}$	$\frac{3}{8}$	$1\frac{7}{8}$
$1\frac{1}{2}$	4.62	1.890	11	$4\frac{3}{4}$	$1\frac{1}{4}$	$\frac{3}{8}$	2
$1\frac{5}{8}$	5.45	2.030	11	$4\frac{7}{8}$	$1\frac{5}{16}$	$\frac{3}{8}$	2
$1\frac{3}{4}$	5.45	2.168	11	5	$1\frac{3}{8}$	$\frac{3}{8}$	$2\frac{1}{8}$
$1\frac{7}{8}$	6.25	2.253	11	$5\frac{1}{8}$	$1\frac{3}{8}$	$\frac{3}{8}$	$2\frac{1}{8}$
2	6.25	2.355	11	$5\frac{1}{8}$	$1\frac{1}{2}$	$\frac{3}{8}$	$2\frac{1}{4}$
$2\frac{1}{8}$	8.50	2.475	11	$5\frac{1}{8}$	$1\frac{1}{2}$	$\frac{7}{16}$	$2\frac{1}{4}$
$2\frac{1}{4}$	8.50	2.595	11	$5\frac{3}{8}$	$1\frac{5}{8}$	$\frac{7}{16}$	$2\frac{3}{8}$
$2\frac{3}{8}$	10.50	2.802	11	$5\frac{1}{2}$	$1\frac{3}{4}$	$\frac{7}{16}$	$2\frac{1}{2}$
$2\frac{1}{2}$	10.50	3.008	11	$5\frac{3}{4}$	2	$\frac{1}{2}$	$2\frac{5}{8}$
$2\frac{5}{8}$	13.00	3.132	11	$5\frac{3}{4}$	2	$\frac{1}{2}$	$2\frac{7}{8}$
$2\frac{3}{4}$	13.00	3.255	11	6	$2\frac{1}{8}$	$\frac{1}{2}$	3
$2\frac{7}{8}$	15.00	3.375	11	$6\frac{1}{4}$	$2\frac{1}{4}$	$\frac{1}{2}$	$3\frac{1}{8}$
3	15.00	3.493	11	$6\frac{1}{2}$	$2\frac{3}{8}$	$\frac{1}{2}$	$3\frac{1}{4}$
$3\frac{1}{4}$	22.00	3.706	11	$6\frac{5}{8}$	$2\frac{1}{2}$	$\frac{1}{2}$	$3\frac{3}{8}$
$3\frac{1}{2}$	22.00	3.920	11	7	$2\frac{5}{8}$	$\frac{1}{2}$	$3\frac{5}{8}$
$3\frac{3}{4}$	33.00	4.133	11	$7\frac{1}{8}$	$2\frac{3}{4}$	$\frac{9}{16}$	$3\frac{3}{4}$
4	33.00	4.348	11	$7\frac{1}{2}$	$2\frac{7}{8}$	$\frac{9}{16}$	4

NOTE:—The sizes in above list are taken from "Practical Engineer's Pocket Book," 1897, published by Technical Publishing Co. Ltd Whitworth St., Manchester, England. The list is declared to be the one most generally recognized in England.

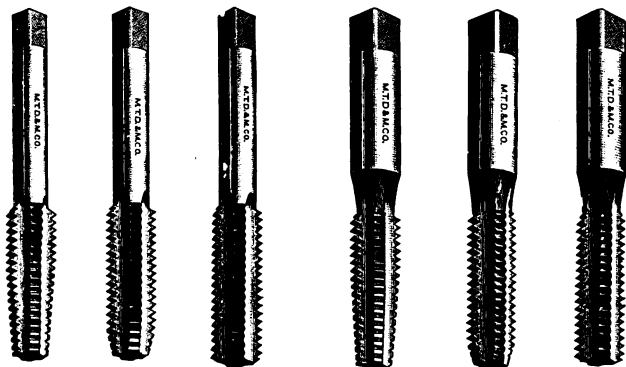


## No. 138.

## SETS OF MACHINISTS' HAND TAPS.

Shanks size of bottom of thread.

Shanks full size of thread.



TAPER. PLUG. BOTTOMING. TAPER. PLUG. BOTTOMING.

## LEFT HAND TAPS ARE SPECIAL.

U. S. Form of Thread always furnished unless otherwise ordered.

We have in stock in both U. S. Standard and V form of thread:

Sizes  $\frac{1}{4}$  to  $\frac{5}{8}$  inch inclusive, 1-64 inch large. } Standard Pitches

Sizes  $\frac{1}{4}$  to 4 inches inclusive, 1-32 inch large. } only.

These sizes take list prices of next sixteenth size smaller. For example a tap  $\frac{1}{4}$  inch diameter takes list price of  $\frac{1}{4}$  inch tap and a tap  $1\frac{1}{2}$  diameter takes list price of 1 inch tap.

In ordering, parties will state whether they wish taps with shanks the full size of thread, or shanks size of bottom of thread. UNLESS OTHERWISE SPECIFIED taps to and including  $\frac{3}{8}$  inch will be furnished with shanks full size of thread. Larger than  $\frac{3}{8}$  inch with shanks size of bottom of thread. Hand Taps with shanks full size of thread furnished at regular list and discount.

A set consists of one each taper, plug and bottoming.

For sizes of Tap Drills see appendix, page XIX.

All sizes, lengths and threads not listed will be considered special and subject to special prices.

For list of sizes and prices see pages 316-317.

For Hand Taps to the A. L. A. M. Standard see page 318.

SPECIAL NOTICE. Read carefully page 310.

## No. 138.

## MACHINISTS' HAND TAPS.

U. S. FORM OF THREAD ALWAYS FURNISHED UNLESS OTHERWISE SPECIFIED.

Diam. Inches.	Price Each.	Price Per Set	Number of Threads to the Inch.					Length, Inches.
			U. S. St'd.	Whit- worth St'd.	"V" Form	Other Threads Also Furnished.		
						U. S. Form.	"V" Form.	
$\frac{1}{16}$	\$0.35	\$1.05	64	60	72	60, 72	60, 64	1 $\frac{3}{4}$
$\frac{5}{64}$	.35	1.05			72	56, 60, 64, 72	56, 60, 64	1 $\frac{3}{4}$
$\frac{3}{32}$	.35	1.05	50	48	56	48, 54, 56, 60	48, 50, 54, 60	1 $\frac{3}{4}$
$\frac{7}{64}$	.35	1.05			56	48, 56	48	1 $\frac{3}{4}$
$\frac{1}{8}$	.35	1.05	40	40	40	27, 32, 36, 48, 50	32, 36, 48, 50	1 $\frac{3}{4}$
$\frac{9}{64}$	.35	1.05			40	32, 36, 40	32, 36	1 $\frac{3}{4}$
$\frac{5}{32}$	.35	1.05	36	32	32	30, 32, 40	30, 36, 40	1 $\frac{3}{4}$
$\frac{11}{64}$	.35	1.05			32	32, 36	36	2 $\frac{1}{4}$
$\frac{3}{16}$	.35	1.05	30	*24	24	24, 27, 32, 36	27, 30, 32, 36	2 $\frac{3}{8}$
$\frac{13}{64}$	.35	1.05			24	24, 32	32	2 $\frac{3}{8}$
$\frac{7}{32}$	.35	1.05	28	24	24	24, 32	32	2 $\frac{3}{8}$
$\frac{15}{64}$	.35	1.05			24	24, 28, 32	32	2 $\frac{1}{2}$
$\frac{1}{4}$	.45	1.35	20	20	20	24, 27, 28, 32	24, 27, 32	2 $\frac{1}{2}$
$\frac{17}{64}$	.45	1.35	20		20	32		2 $\frac{1}{2}$
$\frac{5}{16}$	.50	1.50	18	18	18	20, 24, 27	20, 24, 27, 32	2 $\frac{3}{4}$
$\frac{3}{8}$	.55	1.65	16	16	16	18, 20, 24, 27	14, 18, 20, 24, 27	2 $\frac{1}{2}$
$\frac{7}{16}$	.60	1.80	14	14	14	20, 24, 27	12, 16, 20, 24, 27	3 $\frac{1}{2}$
$\frac{1}{2}$	.70	2.10	13	12	12	12, 20, 24, 27	13, 14, 16, 20, 24, 27	3 $\frac{3}{8}$
$\frac{9}{16}$	.80	2.40	12	12	12	18, 27	14, 27	3 $\frac{1}{2}$
$\frac{5}{8}$	.90	2.70	11	11	11	12, 18, 27	10, 12, 20, 24, 27	3 $\frac{1}{2}$
$\frac{11}{16}$	1.05	3.15	11	11	11	12, 16	10, 12	4 $\frac{1}{2}$
$\frac{3}{4}$	1.20	3.60	10	10	10	12, 16, 27	12, 20, 27	4 $\frac{1}{4}$
$\frac{13}{16}$	1.40	4.20	10	10	10	12	12	4 $\frac{1}{2}$
$\frac{7}{8}$	1.60	4.80	9	9	9	12, 14, 18, 27	10, 12, 27	4 $\frac{1}{2}$
$\frac{15}{16}$	1.80	5.40	9	9	9	12	12	4 $\frac{3}{4}$
1	2.00	6.00	8	8	8	12, 14, 27	12, 27	5 $\frac{1}{8}$
1 $\frac{1}{16}$	2.15	6.45	8		8		12	5 $\frac{1}{8}$
1 $\frac{1}{8}$	2.25	6.75	7	7	7	12	8, 12	5 $\frac{1}{8}$

\* We also furnish  $\frac{1}{16}$  Hand Taps with 32 threads to the inch Whitworth Standard form at regular list and discount.

Left Hand Taps are special.

See page 315 for illustration and general information.

## No. 138.

## MACHINISTS' HAND TAPS—CONTINUED.

U. S. FORM OF THREAD ALWAYS FURNISHED UNLESS OTHERWISE SPECIFIED.

Diameter Inches.	Price Each.	Price Per Set.	Number of Threads to the Inch			Whole Length Inches.
			U. S. Standard.	Whit- worth Standard.	V Form.	
$1\frac{3}{16}$	\$2.45	\$7.35	7		7	$5\frac{7}{16}$
$1\frac{1}{4}$	2.60	7.80	*7	7	*7	$5\frac{3}{4}$
$1\frac{5}{16}$	2.80	8.40	7		7	$5\frac{3}{4}$
$1\frac{3}{8}$	3.00	9.00	6	6	6	$6\frac{1}{8}$
$1\frac{7}{16}$	3.25	9.75	6		6	$6\frac{1}{8}$
$1\frac{1}{2}$	3.50	10.50	6	6	6	$6\frac{3}{8}$
$1\frac{5}{8}$	4.20	12.60	$5\frac{1}{2}$	5	5	$6\frac{1}{16}$
$1\frac{3}{4}$	5.00	15.00	5	5	5	7
$1\frac{7}{8}$	5.80	17.40	5	$4\frac{1}{2}$	$4\frac{1}{2}$	$7\frac{5}{16}$
2	6.70	20.10	$4\frac{1}{2}$	$4\frac{1}{2}$	$4\frac{1}{2}$	$7\frac{5}{8}$
$2\frac{1}{8}$	8.00	24.00	$4\frac{1}{2}$	$4\frac{1}{2}$	$4\frac{1}{2}$	8
$2\frac{1}{4}$	9.20	27.60	$4\frac{1}{2}$	4	$4\frac{1}{2}$	$8\frac{1}{4}$
$2\frac{3}{8}$	10.50	31.50	4	4	$4\frac{1}{2}$	$8\frac{1}{2}$
$2\frac{1}{2}$	11.50	34.50	4	4	4	$8\frac{3}{4}$
$2\frac{5}{8}$	13.00	39.00	4	4	4	9
$2\frac{3}{4}$	14.00	42.00	4	$3\frac{1}{2}$	4	$9\frac{1}{4}$
$2\frac{7}{8}$	15.50	46.50	$3\frac{1}{2}$	$3\frac{1}{2}$	4	$9\frac{1}{2}$
3	17.00	51.00	$3\frac{1}{2}$	$3\frac{1}{2}$	$3\frac{1}{2}$	$9\frac{3}{4}$
$3\frac{1}{8}$	18.75	56.25	$3\frac{1}{2}$	$3\frac{1}{2}$	$3\frac{1}{2}$	$9\frac{3}{4}$
$3\frac{1}{4}$	20.50	61.50	$3\frac{1}{2}$	$3\frac{1}{4}$	$3\frac{1}{2}$	10
$3\frac{3}{8}$	22.00	66.00	$3\frac{1}{4}$	$3\frac{1}{4}$	$3\frac{1}{4}$	10
$3\frac{1}{2}$	24.00	72.00	$3\frac{1}{4}$	$3\frac{1}{4}$	$3\frac{1}{4}$	$10\frac{1}{4}$
$3\frac{5}{8}$	26.00	78.00	$3\frac{1}{4}$	$3\frac{1}{4}$	$3\frac{1}{4}$	$10\frac{1}{4}$
$3\frac{3}{4}$	28.50	85.50	3	3	3	$10\frac{1}{2}$
$3\frac{7}{8}$	30.00	90.00	3	3	3	$10\frac{1}{2}$
4	32.50	97.50	3	3	3	$10\frac{3}{4}$

\*We also furnish  $1\frac{1}{4}$  Hand Taps with 12 threads to the inch, both U. S. Form and V Form at regular list and discount.

Left Hand Taps are special.

See page 315 for illustration and general information.

## No. 138 ½.

## MACHINISTS' HAND TAPS.

## A. I. A. M. STANDARD.

Shanks size of bottom of thread.

Shanks full size of thread.



TAPER.

PLUG.

BOTTOMING.

TAPER.

PLUG.

BOTTOMING.

LEFT HAND TAPS ARE SPECIAL.

Diameter Inches.	Price Each.	Price Per Set.	Number of Threads to the Inch.	Whole Length, Inches.
¼	\$0.45	\$1.35	28	2 ½
⅜	.50	1.50	24	2 ¾
½	.55	1.65	24	2 ¾
⅝	.60	1.80	20	3 ½
¾	.70	2.10	20	3 ¾
⅞	.80	2.40	18	3 ¾
1	.90	2.70	18	3 ¾
1 ¼	1.05	3.15	16	4 ½
1 ½	1.20	3.60	16	4 ½
1 ¾	1.60	4.80	14, 18	4 ½
2	2.00	6.00	14	5 ½


These Taps are made to conform to the standard adopted by the Association of Licensed Automobile Manufacturers. The form of thread is the same as the U. S. Standard, but the pitch is made finer to meet the requirements of automobile builders.

## No. 139.

## MACHINE OR NUT TAPS.

U. S. FORM OF THREAD ALWAYS FURNISHED UNLESS OTHERWISE  
SPECIFIED.

LEFT HAND TAPS ARE SPECIAL.

Diam. Inches.	Price Each.	Number of Threads to the Inch.						Whole Length Inches.	Length of Thread Inches.
		U. S. Std.	Whit- worth Std.	"V" Form.	Other Threads Also Furnished.				
					U. S. Form.	"V" Form.			
									
$\frac{3}{16}$	\$0.60	32	*24	24	24,30	32	4½	1¼	
$\frac{1}{4}$	.60	20	20	20	24,28	24	5	1½	
$\frac{5}{16}$	.70	18	18	18	20,24	16,20,24	5½	1¾	
$\frac{3}{8}$	.80	16	16	16	20,24	14,18	6	2¼	
$\frac{7}{16}$	.90	14	14	14	20	12,16	6½	2½	
$\frac{1}{2}$	1.00	13	12	12	12,20	13	7	2¾	
$\frac{9}{16}$	1.15	12	12	12	18	14	7½	2¾	
$\frac{5}{8}$	1.30	11	11	11	18	10,12	8	2¾	
$\frac{11}{16}$	1.45	11	11	11	16	12	8½	2¾	
$\frac{3}{4}$	1.60	10	10	10	16	12	9	3¼	
$\frac{13}{16}$	1.80	10	10	10		12	9½	3¼	
$\frac{7}{8}$	2.10	9	9	9	14	10,12	10	3¾	
$\frac{15}{16}$	2.40	9	9	9		12	10½	3¾	
1	3.15	8	8	8	14	12	11	4¼	
$1\frac{1}{16}$	3.40	8		8			11	4¼	
$1\frac{1}{8}$	3.60	7	7	7		8	11½	4¾	
$1\frac{3}{16}$	3.90	7		7			11½	4¾	
$1\frac{1}{4}$	4.25	7	7	7			12	4¾	
$1\frac{5}{16}$	4.50	7		7			12	4¾	
$1\frac{3}{8}$	4.80	6	6	6			12½	5¼	
$1\frac{7}{16}$	5.00	6		6			12½	5¼	
$1\frac{1}{2}$	5.65	6	6	6			13	5¾	
$1\frac{5}{8}$	6.50	5½	5	5			13½	5½	
$1\frac{3}{4}$	7.20	5	5	5			14	5½	
$1\frac{7}{8}$	8.25	5	4½	4½			14½	6¼	
2	9.25	4½	4½	4½			15	6¼	

\*Machine Nut Taps  $\frac{3}{16}$  inch with 32 threads per inch Whitworth form, will be furnished at regular list and discount.


See page 320 for general information.

## No. 139.

## MACHINE OR NUT TAPS—CONTINUED.

U. S. FORM OF THREAD ALWAYS FURNISHED UNLESS OTHERWISE SPECIFIED.

LEFT HAND TAPS ARE SPECIAL.



Diameter Inches	Price Each.	Number of Threads to the Inch.			Whole Length, Inches.	Length of Thread Inches.
		U. S. St'd.	Whit- worth St'd.	"V" Form.		
$2\frac{1}{8}$	\$10.80	$4\frac{1}{2}$	$4\frac{1}{2}$	$4\frac{1}{2}$	$15\frac{1}{2}$	$6\frac{1}{8}$
$2\frac{1}{4}$	12.25	$4\frac{1}{2}$	4	$4\frac{1}{2}$	16	$6\frac{1}{8}$
$2\frac{3}{8}$	13.80	4	4	$4\frac{1}{2}$	$16\frac{1}{2}$	$6\frac{1}{8}$
$2\frac{1}{2}$	15.00	4	4	4	17	$6\frac{7}{8}$
$2\frac{5}{8}$	16.80	4	4	4	$17\frac{1}{2}$	$6\frac{7}{8}$
$2\frac{3}{4}$	18.00	4	$3\frac{1}{2}$	4	18	$6\frac{7}{8}$
$2\frac{7}{8}$	19.80	$3\frac{1}{2}$	$3\frac{1}{2}$	4	$18\frac{1}{2}$	$6\frac{7}{8}$
3	21.60	$3\frac{1}{2}$	$3\frac{1}{2}$	$3\frac{1}{2}$	19	$8\frac{1}{4}$
$3\frac{1}{8}$	24.70	$3\frac{1}{2}$	$3\frac{1}{2}$	$3\frac{1}{2}$	$19\frac{1}{2}$	$8\frac{1}{4}$
$3\frac{1}{4}$	26.88	$3\frac{1}{2}$	$3\frac{1}{4}$	$3\frac{1}{2}$	$19\frac{1}{2}$	$8\frac{1}{4}$
$3\frac{3}{8}$	28.75	$3\frac{1}{4}$	$3\frac{1}{4}$	$3\frac{1}{4}$	20	$8\frac{3}{4}$
$3\frac{1}{2}$	31.25	$3\frac{1}{4}$	$3\frac{1}{4}$	$3\frac{1}{4}$	20	$8\frac{3}{4}$
$3\frac{5}{8}$	33.75	$3\frac{1}{4}$	$3\frac{1}{4}$	$3\frac{1}{4}$	$20\frac{1}{2}$	$8\frac{3}{4}$
$3\frac{3}{4}$	36.88	3	3	3	$20\frac{1}{2}$	9
$3\frac{7}{8}$	38.75	3	3	3	21	9
4	41.88	3	3	3	21	9

We have in stock in both U. S. Standard and V form of thread;

Sizes  $\frac{1}{4}$  to  $\frac{5}{8}$  inch inclusive, 1-64 inch large ) Standard  
 Sizes  $\frac{1}{4}$  to 4 inches inclusive, 1-32 inch large ) Pitches  
 only.

These sizes take list prices of next sixteenth size smaller. For example a tap  $\frac{11}{16}$  inch diameter takes list price of  $\frac{1}{4}$  inch tap and a tap  $1\frac{1}{16}$  inches diameter takes list price of 1 inch tap.

In ordering always state exact diameter and thread wanted.

When exact duplicates are wanted, special orders should always be accompanied by a stub fitted with a nut.

# **No. 140.** **TAPS FOR MACHINE SCREWS.**



LEFT HAND TAPS ARE SPECIAL.

Size of Screw Gauge Number.	Standard Number of Threads.	Price Each.	Price per Dozen	Whole Length, Inches.	Length of Threads, Inches.	Threads as follows furnished at regular list and discount.
1		\$ .35	\$4.00	1 $\frac{3}{4}$	$\frac{1}{2}$	56, 60, 64, 72
1 $\frac{1}{2}$	56	.35	4.00	1 $\frac{3}{4}$	$\frac{1}{2}$	
2	56	.35	4.00	1 $\frac{3}{4}$	$\frac{1}{2}$	48, 64
3	48	.35	4.00	1 $\frac{3}{4}$	$\frac{1}{2}$	40, 56
4	36	.35	4.00	1 $\frac{3}{4}$	$\frac{1}{8}$	32, 40, 42, 48
5	36	.35	4.00	1 $\frac{3}{4}$	$\frac{1}{8}$	32, 40
6	32	.35	4.00	1 $\frac{3}{4}$	$\frac{5}{8}$	30, 36, 38, 40, 48
7	32	.35	4.00	1 $\frac{3}{4}$	$\frac{5}{8}$	30, 40
8	32	.35	4.00	2 $\frac{1}{4}$	$\frac{5}{8}$	30, 36, 40
9	30	.35	4.00	2 $\frac{3}{8}$	$\frac{1}{8}$	28, 32
10	24	.35	4.00	2 $\frac{3}{8}$	$\frac{1}{8}$	28, 30, 32, 36
11	24	.35	4.00	2 $\frac{3}{8}$	$\frac{1}{8}$	28, 30
12	24	.35	4.00	2 $\frac{3}{8}$	$\frac{1}{8}$	20, 32
13	22	.38	4.40	2 $\frac{1}{2}$	1	20, 24, 32
14	20	.38	4.40	2 $\frac{1}{2}$	1	18, 24
15	20	.38	4.40	2 $\frac{1}{2}$	1	18, 24
16	18	.38	4.40	2 $\frac{1}{2}$	1	16, 20
18	18	.38	4.40	2 $\frac{1}{2}$	1	16, 20
20	16	.45	5.30	2 $\frac{3}{4}$	1 $\frac{1}{8}$	18
22	16	.45	5.30	2 $\frac{3}{4}$	1 $\frac{1}{8}$	18
24	16	.45	5.30	2 $\frac{1}{8}$	1 $\frac{1}{4}$	14, 18
26	16	.53	6.30	2 $\frac{1}{8}$	1 $\frac{1}{4}$	14
28	14	.53	6.30	3 $\frac{5}{32}$	1 $\frac{7}{16}$	16
30	14	.53	6.30	3 $\frac{5}{32}$	1 $\frac{7}{16}$	16

Less than six taps of a size and thread at single prices. Sizes and threads not listed subject to special prices.

When so ordered, these Taps will be furnished in sets of Taper, Plug and Bottoming forms, like Hand Taps.

NOTE:—We carry a stock of these Taps and will furnish them whenever called for; but we strongly recommend the adoption of the A. S. M. E. Standard wherever possible. Taps made to the A. S. M. E. Standard are listed on page 322.

**No. 140 A.**  
**TAPS FOR MACHINE SCREWS.**  
**A. S. M. E. STANDARD.\***



LEFT HAND TAPS ARE SPECIAL.

Size of Screw Gauge Number	Approx. Diameter of Tap, Inches.	Standard Number of Threads.	Price Each.	Price per Dozen.	Whole Length, Inches.	Threads as follows furnished at regular list and discount.
0	.060	80	\$ .35	\$4.00	1¾	
1	.073	72	.35	4.00	1¾	64
2	.086	64	.35	4.00	1¾	56
3	.099	56	.35	4.00	1¾	48
4	.112	48	.35	4.00	1¾	36, 40
5	.125	44	.35	4.00	1¾	36, 40
6	.138	40	.35	4.00	1¾	32, 36
7	.151	36	.35	4.00	1¾	30, 32
8	.164	36	.35	4.00	2¼	30, 32
9	.177	32	.35	4.00	2¾	24, 30
10	.190	30	.35	4.00	2¾	24, 32
12	.216	28	.35	4.00	2¾	24
14	.242	24	.38	4.40	2½	20
16	.268	22	.38	4.40	2½	20
18	.294	20	.38	4.40	2½	18
20	.320	20	.45	5.30	2¾	18
22	.346	18	.45	5.30	2¾	16
24	.372	16	.45	5.30	2½	18
26	.398	16	.53	6.30	2½	14
28	.424	14	.53	6.30	3½	16
30	.450	14	.53	6.30	3½	16

We recommend the use of this standard wherever possible.

It replaces the makeshift sizes heretofore used and makes possible interchangeability of Taps and Screws produced by the different manufacturers.

Less than six taps of a size and thread at single prices. Sizes and threads not on the list subject to special prices.

When so ordered these Taps will be furnished in sets of Taper, Plug and Bottoming forms, like Hand Taps.

\*As recommended by the American Society of Mechanical Engineers at the Indianapolis meeting, May 1907.

See tables in appendix pages xvii, xviii, and xxi.



# **No. 141.**

## **PULLEY TAPS.**



**LEFT HAND TAPS ARE SPECIAL.**

Diam. Inches	Th'ds per In. U.S. Std & VForm	Price each by Lengths.									
		6 in.	8 in.	10 in.	12 in.	14 in.	16 in.	18 in.	20 in.	22 in.	24 in.
$\frac{1}{4}$	20	\$ .65	\$ .70	\$ .80	\$ .90						
$\frac{5}{16}$	18	.75	.80	1.00	1.20						
$\frac{3}{8}$	16	.80	.90	1.10	1.30	\$1.40	\$1.55	\$1.70			
$\frac{7}{16}$	14	.90	1.00	1.20	1.40	1.50	1.65	1.80			
$\frac{1}{2}$	12 13	1.00	1.15	1.30	1.45	1.60	1.75	1.90	\$2.05		
$\frac{9}{16}$	12	1.10	1.30	1.45	1.55	1.70	1.85	2.05	2.20	\$2.35	
$\frac{5}{8}$	11	1.20	1.35	1.50	1.60	1.75	1.90	2.10	2.25	2.40	\$2.55
$\frac{11}{16}$	11	1.30	1.45	1.55	1.70	1.90	2.05	2.20	2.35	2.50	2.65
$\frac{3}{4}$	10	1.40	1.50	1.60	1.80	2.00	2.15	2.30	2.45	2.60	2.75
$\frac{13}{16}$	10	1.60	1.70	1.80	2.00	2.15	2.30	2.45	2.60	2.75	2.90
$\frac{7}{8}$	9	1.80	1.90	2.10	2.30	2.50	2.70	2.90	3.10	3.30	3.50
$\frac{15}{16}$	9	2.00	2.10	2.30	2.50	2.70	2.90	3.10	3.30	3.50	3.70
1	8	2.25	2.30	2.50	2.70	2.90	3.10	3.30	3.50	3.70	3.90

We also furnish the above sizes in Whitworth Standard Threads.  
Other sizes and threads made to order and furnished at special prices.  
When ordering, specify length desired.  
U. S. Form of thread always furnished unless otherwise ordered.

## **No 141B.**

## **BIT BRACE TAPS.**



**LEFT HAND TAPS ARE SPECIAL.**

Diameter, Inches.	Price Each.	Threads per Inch.		Whole Length Inches.
		U. S. Standard.	"V" Form.	
$\frac{3}{16}$	\$ .50	32	24	$3\frac{7}{8}$
$\frac{1}{4}$	.50	20	20	4
$\frac{5}{16}$	.55	18	18	$4\frac{1}{4}$
$\frac{3}{8}$	.60	16	16	$4\frac{1}{2}$
$\frac{7}{16}$	.70	14	14	$4\frac{1}{2}$
$\frac{1}{2}$	.80	13	12	$4\frac{3}{4}$

U. S. Form of thread always furnished unless otherwise ordered.  
Sizes and threads not listed will be considered special and subject to  
special prices.

## No. 142.

## HOB OR MASTER TAPS.



Hob Taps with left hand thread or of other pitches than those listed will be furnished to order at special prices.

U. S. Form of thread always furnished unless otherwise ordered.

Diameter, Inches.	Price Each.	Threads per Inch.			Whole Length, Inches.
		U. S. Standard.	Whitworth Standard.	"V" Form.	
$\frac{1}{4}$	\$ .75	20	20	20	$5\frac{1}{2}$
$\frac{5}{16}$	.87	18	18	18	$5\frac{7}{8}$
$\frac{3}{8}$	1.00	16	16	16	$6\frac{1}{8}$
$\frac{7}{16}$	1.12	14	14	14	$6\frac{1}{2}$
$\frac{1}{2}$	1.25	* 13	12	12	$6\frac{3}{4}$
$\frac{9}{16}$	1.44	12	12	12	$7\frac{1}{8}$
$\frac{5}{8}$	1.62	11	11	11	$7\frac{3}{8}$
$\frac{11}{16}$	1.81	11	11	11	$7\frac{3}{4}$
$\frac{3}{4}$	2.00	10	10	10	8
$\frac{13}{16}$	2.25	10	10	10	$8\frac{1}{4}$
$\frac{7}{8}$	2.62	9	9	9	$8\frac{1}{2}$
$\frac{15}{16}$	3.00	9	9	9	$8\frac{3}{4}$
1	3.50	8	8	8	9
$1\frac{1}{8}$	4.00	7	7	7	$9\frac{1}{2}$
$1\frac{1}{4}$	4.62	7	7	7	10
$1\frac{3}{8}$	5.25	6	6	6	$10\frac{1}{2}$
$1\frac{1}{2}$	5.87	6	6	6	11
$1\frac{5}{8}$	6.62	$5\frac{1}{2}$	5	5	$11\frac{3}{8}$
$1\frac{3}{4}$	7.50	5	5	5	$11\frac{3}{4}$
$1\frac{7}{8}$	8.50	5	$4\frac{1}{2}$	$4\frac{1}{2}$	$12\frac{1}{8}$
2	9.62	$4\frac{1}{2}$	$4\frac{1}{2}$	$4\frac{1}{2}$	$12\frac{3}{8}$

\*We also furnish  $\frac{1}{2}$  inch size with 12 threads to the inch U. S. Form at regular list and discount.

In ordering Hob Taps always state whether they are required for hobbing chasers in Bolt Cutters, Solid Dies, or Screw Plate Dies.

Hob Taps of special design made from description or drawings submitted with orders, giving details of lengths and diameter required.

**No. 143.****TAPS FOR BEAMAN  
& SMITH HOLDERS.**

LEFT HAND TAPS ARE SPECIAL.

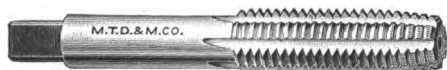
Diam., Inches.	Threads Per Inch.		Price Each.	Fitting Holders.	Diam., Inches.	Threads Per Inch.		Price Each.	Fitting Holders.
	U. S. St'd.	"V" Form.				U. S. St'd.	"V" Form.		
1/4	20	20	\$ .45	No. 1.	5/8	11	11	\$ .90	No. 2.
5/16	18	18	.50		1 1/8	11	11	1.05	
3/8	16	16	.55		3/4	10	10	1.20	
7/16	14	14	.60		1 1/4	10	10	1.40	
1/2	13	12	.70		1 1/2	9	9	1.60	
5/8	12	12	.80		1 3/4	9	9	1.80	
	11	11	.90		1 7/8	8	8	2.00	
					2	7	7	2.25	
								2.60	

U. S. form of thread always furnished unless otherwise ordered.

Sizes and threads not listed will be considered as special and subject to special prices.

Prices of Taps fitting Nos. 2 1/2 and 3 Holders given on application.

These Taps will be furnished in the A. L. A. M. Standard Thread at regular list and discount.

**No. 144.****SHORT PLUG  
HOB TAP.**

LEFT HAND TAPS ARE SPECIAL.

Diam. Inches.	Threads Per Inch.		Price Each.	Whole Length, Inches.	Diam. Inches.	Threads Per Inch.		Price Each.	Whole Length, Inches.
	U. S. St'd.	"V" Form.				U. S. St'd.	"V" Form.		
1/4	20	20	\$ .60	3	1 1/8	9	9	\$2.40	5 5/8
5/16	18	18	.70	3 1/4	1	8	8	2.80	5 7/8
3/8	16	16	.80	3 1/2	1 1/8	7	7	3.20	6 1/4
7/16	14	14	.90	3 3/4	1 1/4	7	7	3.70	6 5/8
1/2	*13	12	1.00	4	1 3/8	6	6	4.20	7
5/8	12	12	1.15	4 1/4	1 1/2	6	6	4.70	7 3/8
3/4	11	11	1.30	4 1/2	1 5/8	5 1/2	5	5.30	7 3/4
7/8	11	11	1.45	4 3/4	1 3/4	5	5	6.00	8
	10	10	1.60	5	1 7/8	5	4 1/2	6.80	8 1/4
	10	10	1.80	5 1/8	2	4 1/2	4 1/2	7.70	8 1/2
	9	9	2.10	5 3/8					

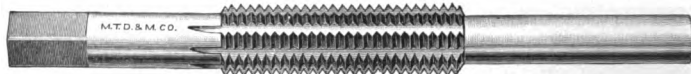
\*We also furnish 1/2 inch size with 12 threads to the inch, U. S. form at regular list and discount.

We also furnish the above sizes in Whitworth Standard Threads.

U. S. form of thread always furnished unless otherwise ordered.

These Hobs are intended especially for recutting Opening and Screw Plate Dies. When wanted for Screw Plate Dies it should be so stated on the order, as they are made larger for this particular work.

# **No. 145.** **SELLERS' HOB TAPS.**



LEFT HAND TAPS ARE SPECIAL.

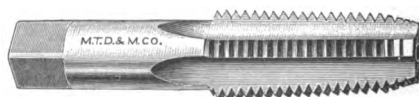
Diam., Inches.	Threads Per Inch.		Price Each.	Whole Length, Inches.	Diam., Inches.	Threads Per Inch.		Price Each.	Whole Length, Inches.
	U. S. St'd.	"V" Form.				U. S. St'd.	"V" Form.		
$\frac{1}{4}$	20	20	\$ .90	$4\frac{5}{8}$	$\frac{1}{8}$	9	9	\$3.60	$8\frac{1}{8}$
$\frac{5}{16}$	18	18	1.05	5	1	8	8	4.20	$8\frac{3}{4}$
$\frac{3}{8}$	16	16	1.20	$5\frac{3}{8}$	$1\frac{1}{8}$	7	7	4.80	$9\frac{3}{4}$
$\frac{7}{16}$	14	14	1.35	$5\frac{7}{8}$	$1\frac{1}{4}$	7	7	5.55	$9\frac{3}{4}$
$\frac{1}{2}$	*13	12	1.50	$6\frac{1}{8}$	$1\frac{3}{8}$	6	6	6.30	11
$\frac{5}{8}$	12	12	1.75	$6\frac{1}{2}$	$1\frac{1}{2}$	6	6	7.05	11
$\frac{3}{4}$	11	11	1.95	7	$1\frac{5}{8}$	$5\frac{1}{2}$	5	7.95	$11\frac{3}{4}$
$\frac{7}{8}$	11	11	2.20	7	$1\frac{3}{4}$	5	5	9.00	$12\frac{3}{4}$
$\frac{1}{2}$	10	10	2.40	$7\frac{3}{8}$	$1\frac{7}{8}$	5	$4\frac{1}{2}$	10.20	$12\frac{7}{8}$
$\frac{3}{4}$	10	10	2.70	$7\frac{3}{8}$	2	$4\frac{1}{2}$	$4\frac{1}{2}$	11.55	$13\frac{7}{8}$
$\frac{7}{8}$	9	9	3.15	$8\frac{1}{8}$					

\*We also furnish  $\frac{1}{2}$  inch size with 12 threads to the inch U. S. Form at regular list and discount.

We also furnish the above sizes in Whitworth Standard Threads.

Sizes and threads not listed will be furnished to order at special prices.

U. S. Form of thread always furnished unless otherwise ordered.



## **No. 146.**

## **PATCH-BOLT TAPS.**

Diameter, Inches.	Threads Per Inch.		Price Each.	Diameter, Inches.	Threads Per Inch.		Price Each.
	U. S. Form.	"V" Form.			U. S. Form.	"V" Form.	
$\frac{1}{2}$	12	12	\$ .70	$\frac{15}{16}$	12	12	\$1.80
$\frac{9}{16}$	12	12	.80	1	12	12	2.00
$\frac{5}{8}$	12	12	.90	$1\frac{1}{16}$	12	12	2.15
$\frac{11}{16}$	12	12	1.05	$1\frac{1}{8}$	12	12	2.25
$\frac{3}{4}$	12	12	1.20	$1\frac{3}{16}$	12	12	2.45
$\frac{13}{16}$	12	12	1.40	$1\frac{1}{4}$	12	12	2.60
$\frac{7}{8}$	12	12	1.60				

These Taps all have a whole length of  $3\frac{1}{2}$  inches. They are made especially for boiler makers and have a taper of  $\frac{3}{4}$  inch to the foot for the purpose of making the bolt a steam-tight fit.

They are furnished  $\frac{3}{32}$  oversize at regular prices.

## No. 146 A.

## STRAIGHT AND TAPER BOILER TAPS.

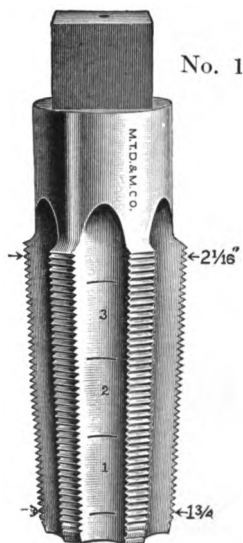


Straight and Taper Boiler Taps are carried in stock  $\frac{1}{32}$  inch over size up to  $1\frac{1}{4}$  inches, and will be furnished at same prices as standard sizes.

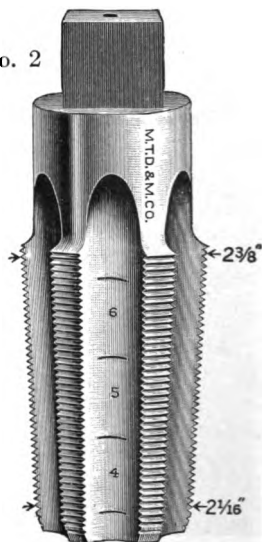
All taps have 12 threads to the inch and will be furnished in either U. S. form or V form of thread.

When ordering specify form of thread desired.

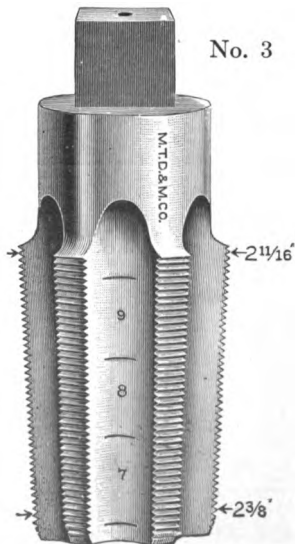
Diameter, Inches.	Price Each.	Whole Length, Inches.	Diameter, Inches.	Price Each.	Whole Length, Inches.
$\frac{1}{2}$	\$1.00	$4\frac{1}{4}$	$1\frac{5}{16}$	\$4.00	$7\frac{1}{4}$
$\frac{9}{16}$	1.15	$4\frac{5}{8}$	$1\frac{3}{8}$	4.30	$7\frac{3}{8}$
$\frac{5}{8}$	1.30	5	$1\frac{7}{16}$	4.60	$7\frac{1}{2}$
$\frac{11}{16}$	1.45	$5\frac{1}{4}$	$1\frac{1}{2}$	4.90	$7\frac{5}{8}$
$\frac{3}{4}$	1.60	$5\frac{1}{2}$	$1\frac{5}{8}$	5.10	$7\frac{3}{4}$
$\frac{13}{16}$	1.80	$5\frac{3}{4}$	$1\frac{3}{4}$	5.40	$7\frac{7}{8}$
$\frac{7}{8}$	2.10	6	$1\frac{7}{8}$	5.70	8
$\frac{15}{16}$	2.40	$6\frac{1}{4}$	2	6.00	8
1	2.80	$6\frac{1}{2}$	$2\frac{1}{8}$	6.50	8
$1\frac{1}{16}$	3.00	$6\frac{3}{4}$	$2\frac{1}{4}$	7.00	8
$1\frac{1}{8}$	3.20	$6\frac{7}{8}$	$2\frac{3}{8}$	7.50	8
$1\frac{3}{8}$	3.40	7	$2\frac{1}{2}$	8.00	8
$1\frac{1}{4}$	3.70	$7\frac{1}{8}$			



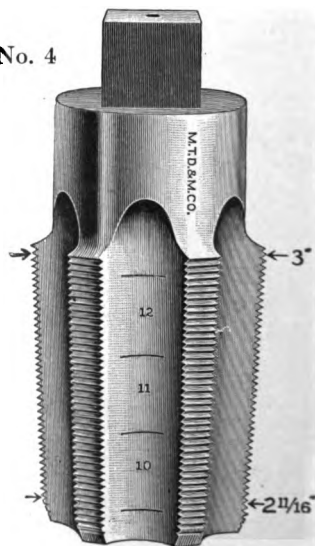
No. 2

**No. 146 B****MUD OR  
WASHOUT  
TAPS**

No. 3



No. 4



**No. 146 B.****MUD OR WASHOUT TAPS.**

Used for tapping washout holes in locomotives.

A set consists of four taps having  $1\frac{1}{4}$  inch taper in 12 inches.

Tap No. 1 is  $1\frac{3}{4}$  inches in diameter at small end, and tap No. 4 is 3 inches in diameter at large end.

The taps are marked as shown in the illustrations and correspond with taper plugs bearing the same numbers as the twelve diameters shown in the four taps.

The taps are  $6\frac{1}{2}$  inches long and all have the same size square.

These taps will be furnished with either U. S. form or V form of thread, 12 to the inch, at regular list and discount.

When ordering specify form of thread desired.

Number.	Taper, Inches.	Price Each
1 . . . . .	$1\frac{3}{4}$ to $2\frac{1}{8}$ . . . . .	\$6.00
2 . . . . .	$2\frac{1}{8}$ to $2\frac{3}{8}$ . . . . .	7.50
3 . . . . .	$2\frac{3}{8}$ to $2\frac{1}{2}$ . . . . .	9.00
4 . . . . .	$2\frac{1}{2}$ to 3 . . . . .	10.50

## No. 147. TAPPER TAPS.



**LEFT HAND TAPS ARE SPECIAL.**

Diameter. Inches.	Threads per Inch.			Length of Thread Inches	Price Each by Lengths.			
	U. S. Std.	U. S. Form.	V Form.		11 In.	12 In.	14 In.	15 In.
$\frac{1}{4}$	20	28	20	$1\frac{3}{4}$	\$ .70	\$ .75	\$ .80	\$ .90
$\frac{5}{16}$	18	24	18	2	.80	.85	.90	1.00
$\frac{3}{8}$	16	24	16	2	.90	.95	1.00	1.10
$\frac{7}{16}$	14	20	14	$2\frac{1}{4}$	1.00	1.05	1.15	1.25
$\frac{1}{2}$	13	12, 20	12, 13	$2\frac{1}{4}$	1.12	1.15	1.25	1.35
$\frac{9}{16}$	12	18	12	$2\frac{1}{2}$	1.30	1.35	1.45	1.55
$\frac{5}{8}$	11	18	11	$2\frac{1}{2}$	1.45	1.50	1.65	1.75
$\frac{11}{16}$	11	16	11	$2\frac{1}{2}$	1.62	1.70	1.80	1.95
$\frac{3}{4}$	10	16	10	$2\frac{3}{4}$	1.80	1.85	2.00	2.10
$\frac{13}{16}$	10		10	$2\frac{3}{4}$	2.05	2.10	2.25	2.35
$\frac{7}{8}$	9	14	9	3	2.35	2.45	2.60	2.75
$\frac{15}{16}$	9		9	3	2.70	2.75	3.00	3.15
1	8	14	8	$3\frac{1}{2}$	3.15	3.20	3.50	3.65
$1\frac{1}{8}$	7		7	$3\frac{1}{2}$	3.60	3.70	3.95	4.10
$1\frac{1}{4}$	7		7	$3\frac{1}{2}$	4.15	4.25	4.50	4.65
$1\frac{3}{8}$	6		6	4	4.70	4.80	5.05	5.20
$1\frac{1}{2}$	6		6	4	5.30	5.40	5.65	5.80

We also furnish the above sizes in Whitworth Standard Threads.

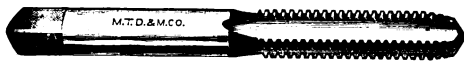
Other sizes and threads made to order and furnished at special prices.

When ordering specify length desired.

U. S. Form of thread always furnished unless otherwise ordered.

Tapper Taps are furnished for rough iron  $\frac{1}{64}$  over size from  $\frac{1}{4}$  to  $\frac{5}{8}$  inch inclusive;  $\frac{3}{2}$  oversize from  $\frac{1}{4}$  to  $1\frac{1}{2}$  inches inclusive, at regular prices.

Prices of these Taps with special shaped shank ends fitting Nut Tapping Machines, given on application.



## No. 148. STOVE BOLT TAPS

Diam., Inches.	Threads per Inch	Price Each.	Price Per Dozen.	Diam., Inches.	Threads per Inch.	Price Each.	Price Per Dozen.
$\frac{5}{32}$	28	\$ .35	\$4.00	$\frac{1}{4}$	18	.38	4.40
$\frac{3}{16}$	24	.35	4.00	$\frac{5}{16}$	18	.38	4.40
$\frac{7}{32}$	22	.35	4.00	$\frac{3}{8}$	16	.45	5.30

Sizes and Threads not listed will be charged at special prices.

Less than six Taps of a size will be charged at single prices.



## No. 149.

## STAY BOLT TAPS FOR BOILER WORK.

In ordering, state diameter, pitch and form of thread, also lengths of parts A, B, C, D and F.

These Taps will be furnished in either U. S. form or V form of thread, 12 to the inch at regular list and discount.

Diameter given is that of the thread at its straight part.

Prices are for each inch of length 16 inches and upwards.

Taps shorter than 16 inches will be charged as if 16 inches long.

When ordering specify form of thread desired.

Blank order slips furnished on application.

Diameter, Inches.	Price Per Inch.
$\frac{3}{4}$ to $\frac{7}{8}$ inclusive	\$ .40
$\frac{1}{2}$ to 1 inclusive	.45
$1\frac{1}{8}$ to $1\frac{1}{2}$ inclusive	.50
$1\frac{3}{8}$ to $1\frac{1}{4}$ inclusive	.55
$1\frac{5}{8}$ to $1\frac{3}{4}$ inclusive	.60
$1\frac{7}{8}$ to $1\frac{1}{2}$ inclusive	.70

The Table of Lengths given below is one made up of average lengths taken from a large number of orders, and is listed merely as a suggestion or aid in making up specifications.

## AVERAGE LENGTHS.

Whole Length of Tap, Inches.	Length, Inches.				
	A	B	C	D	E
12	1	3	3	$2\frac{1}{2}$	$2\frac{1}{2}$
14	1	4	3	3	3
16	1	$4\frac{1}{2}$	3	$3\frac{1}{2}$	4
18	1	5	$3\frac{1}{2}$	4	$4\frac{1}{2}$
21	1	6	4	$4\frac{1}{2}$	$5\frac{1}{2}$
24	1	8	4	5	6
27	1	9	4	6	7
30	1	10	5	6	8
33	1	11	5	6	10
36	1	12	5	6	12
39	1	13	6	7	12
42	1	14	6	8	13
48	1	16	8	9	14
54	1	18	8	10	17



## No. 149½.

## SPINDLE STAY-BOLT TAPS.



Used for retapping stay-bolt holes from the inside of fire-box of locomotives.

These Taps will be furnished with either U. S. form or V form of thread, 12 to the inch.

When ordering specify form of thread desired.

Other sizes and lengths than those named below will be furnished to order at special prices.

Diameter, Inches.	Price Each.	Length of Fluted Thread, Inches.	Length of Unfluted Thread, Inches.	Whole Length, Inches.	Diameter of Spindle, Inches.	Length of Spindle, Inches.
$\frac{3}{4}$	\$8.00	$3\frac{1}{4}$	$2\frac{3}{4}$	$7\frac{5}{8}$	$\frac{3}{8}$	11
$\frac{1}{2}$	8.50	$3\frac{1}{4}$	$2\frac{3}{4}$	$7\frac{5}{8}$	$\frac{3}{8}$	11
$\frac{7}{8}$	9.00	$3\frac{1}{4}$	$2\frac{3}{4}$	$7\frac{5}{8}$	$\frac{3}{8}$	11
$\frac{1}{2}$	9.50	$3\frac{1}{4}$	$2\frac{3}{4}$	$7\frac{5}{8}$	$\frac{3}{8}$	11
1	10.00	$3\frac{1}{4}$	$2\frac{3}{4}$	$7\frac{5}{8}$	$\frac{3}{8}$	11
$1\frac{1}{8}$	10.50	$3\frac{1}{4}$	$2\frac{3}{4}$	$7\frac{5}{8}$	$\frac{3}{8}$	11
$1\frac{1}{8}$	11.00	$3\frac{1}{4}$	$2\frac{3}{4}$	$7\frac{5}{8}$	$\frac{3}{8}$	11
$1\frac{3}{16}$	11.50	$3\frac{1}{4}$	$2\frac{3}{4}$	$7\frac{5}{8}$	$\frac{3}{8}$	11
$1\frac{1}{4}$	12.00	$3\frac{1}{4}$	$2\frac{3}{4}$	$7\frac{5}{8}$	$\frac{3}{8}$	11
$1\frac{5}{16}$	12.25	$3\frac{1}{4}$	$2\frac{3}{4}$	$7\frac{5}{8}$	$\frac{3}{8}$	11
$1\frac{3}{8}$	12.50	$3\frac{1}{4}$	$2\frac{3}{4}$	$7\frac{5}{8}$	$\frac{3}{8}$	11
$1\frac{7}{8}$	12.75	$3\frac{1}{4}$	$2\frac{3}{4}$	$7\frac{5}{8}$	$\frac{3}{8}$	11
$1\frac{1}{2}$	13.00	$3\frac{1}{4}$	$2\frac{3}{4}$	$7\frac{5}{8}$	$\frac{3}{8}$	11

If these Taps are desired with threaded holes and a threaded spindle they can be so furnished at special prices. Send full specifications with order or request for prices.

## No. 150.

## BLACKSMITHS' TAPER TAPS.



LEFT HAND TAPS ARE SPECIAL.

Diameter, Tap, Inches.	Price Each.	Number of V Threads to the Inch.	Whole Length, Inches.
$\frac{1}{4}$	\$ .30	18, 20, 24	$2\frac{1}{2}$
$\frac{5}{16}$	.30	16, 18, 20	$3\frac{5}{16}$
$\frac{3}{8}$	.35	14, 16, 18	$3\frac{1}{2}$
$\frac{7}{16}$	.40	14, 16, 18	$4\frac{1}{8}$
$\frac{1}{2}$	.40	12, 13, 14, 16	$4\frac{5}{16}$
$\frac{9}{16}$	.50	12, 14	$4\frac{5}{8}$
$\frac{5}{8}$	.50	10, 11, 12	$4\frac{7}{8}$
$\frac{3}{4}$	.65	10, 12	$5\frac{1}{8}$
$\frac{7}{8}$	.90	9, 10	$5\frac{5}{8}$
1	1.25	8	6
$1\frac{1}{8}$	1.50	7, 8	$6\frac{5}{8}$
$1\frac{1}{4}$	1.75	7, 8	$7\frac{1}{8}$
$1\frac{1}{2}$	3.00	6	$7\frac{7}{8}$

These Taps are furnished with the V form of thread and are tapered  $\frac{3}{4}$  of an inch to the foot.

All sizes and threads not listed are special and subject to special prices.

**No. 151****SCREW PLATES.****No. 153.**

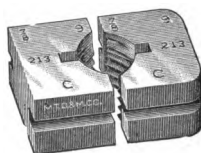
Our Patent Screw Plates are of an improved pattern and finish. They are light and durable, and are so perfected as to admit of a change of Die most quickly. The Dies and Plates are carefully finished to standard gauges, and are warranted as to accuracy of size. The Dies are interchangeable. Under or over size Bolts are always properly cut with standard size Dies.

**No. 153.**

Size A, with 3 pair Dies, cutting  $\frac{1}{8}$  to  $\frac{1}{4}$ ,  $\frac{3}{8}$  to  $\frac{1}{2}$ ,  $\frac{1}{2}$  to  $\frac{3}{4}$ , \$5.00  
 Size B, with 4 pair Dies, cutting  $\frac{1}{8}$  to  $\frac{1}{4}$ ,  $\frac{3}{8}$  to  $\frac{1}{2}$ ,  $\frac{1}{2}$  to  $\frac{3}{4}$ ,  $\frac{3}{4}$  to 1, 8.00  
 Size C, with 4 pair Dies, cutting  $\frac{1}{8}$  to  $\frac{1}{4}$ ,  $\frac{3}{8}$  to  $\frac{1}{2}$ ,  $\frac{1}{2}$  to  $\frac{3}{4}$ ,  $\frac{3}{4}$  to 1, 10.00

**No. 151.**

Size D, 4 pair Dies, cutting  $\frac{1}{8}$  to  $\frac{1}{4}$ ,  $\frac{3}{8}$  to  $\frac{1}{2}$ ,  $\frac{1}{2}$  to  $\frac{3}{4}$ ,  $\frac{3}{4}$  to 1, \$13.00  
 Size E, with 6 pair Dies, cutting  $\frac{1}{8}$  to  $\frac{1}{4}$ ,  $\frac{3}{8}$  to  $\frac{1}{2}$ ,  $\frac{1}{2}$  to  $\frac{3}{4}$ ,  $\frac{3}{4}$  to 1,  $1\frac{1}{8}$  to  $1\frac{1}{2}$ ,  $1\frac{1}{2}$  to 2, 33.00

**No. 152.****PRICES OF SINGLE PARTS OF SCREW PLATES.**

Size	Whole Length of Plate, Inches	Capacity, Inches.	Price of Screw Plates without Dies.	Dies Furnished at Regular List and Discount. Size, Inches.	Price of Single Pair of Dies.
No. 1	6 $\frac{1}{2}$	$\frac{1}{8}$ to $\frac{1}{4}$	\$1.60	$\frac{1}{8}$ to $\frac{1}{4}$ by 32ds	\$ .40
A	13 $\frac{3}{4}$	$\frac{1}{4}$ to $\frac{5}{8}$	2.50	$\frac{1}{4}$ to $\frac{5}{8}$ by 16ths	1.00
B	19	$\frac{1}{4}$ to $\frac{7}{8}$	3.25	$\frac{1}{4}$ to $\frac{7}{8}$ by 16ths	1.25
C	21 $\frac{7}{8}$	$\frac{3}{8}$ to 1	4.00	$\frac{3}{8}$ to 1 by 16ths	1.75
D	28 $\frac{3}{4}$	$\frac{1}{8}$ to $1\frac{1}{2}$	5.00	$\frac{1}{8}$ to $1\frac{1}{2}$ by 16ths	2.00
E	40 $\frac{5}{8}$	$1\frac{3}{8}$ to 2	15.00	$1\frac{3}{8}$ to 2 by 16ths	3.00

SCREW  
PLATES  
D & E

SCREW  
PLATES  
A, B & C

All sizes of Dies not listed and Dies with other than standard number of threads per inch furnished at special prices.

\*All Dies regularly listed  $\frac{1}{2}$  inch, furnished with either 12 or 13 threads per inch U. S. S. or V form of thread at regular prices.

U. S. form of thread always furnished unless otherwise ordered.

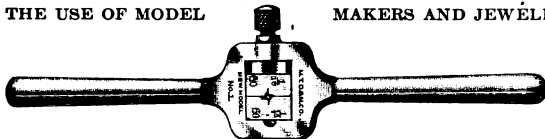
Blank Dies one-half above prices.

A. L. A. M. Standard sizes furnished at regular prices.

**No. 154.****No. 1 SCREW PLATE AND DIES.**

FOR THE USE OF MODEL

MAKERS AND JEWELERS.

Price  
Per Set.No. 1 Screw Plate, with 5 pair of Dies and 5 Taps, cutting  $\frac{1}{8}^{40}$ , $\frac{5}{32}^{36}, \frac{3}{16}^{30}, \frac{7}{32}^{28}, \frac{1}{2}^{20}$ 

\$4.50

The set complete includes Plate, Dies, Taps and Adjustable Wrench 6.00

For Nos. 155 and 156 see page 336.

**No. 157.****MACHINISTS' SCREW PLATES.**

WITH TAPS, DIES AND WRENCHES.

Price  
Per Set.

A <sup>2</sup>	{ 1 Screw Plate A and 1 pair Dies each $\frac{1}{4}^{20}, \frac{3}{8}^{16}, \frac{1}{2}^{13}$	}	\$6.80
	{ 1 Plug Tap each $\frac{1}{4}^{20}, \frac{3}{8}^{16}, \frac{1}{2}^{13}$		
	With 1 Tap Wrench A		9.80
A <sup>3</sup>	{ 1 Screw Plate A and 1 pair Dies $\frac{1}{4}^{20}, \frac{3}{8}^{16}, \frac{1}{2}^{13}, \frac{5}{8}^{11}$	}	8.50
	{ 1 Plug Tap each $\frac{1}{4}^{20}, \frac{3}{8}^{16}, \frac{1}{2}^{13}, \frac{5}{8}^{11}$		
	With 1 Tap Wrench A		11.50
B <sup>2</sup>	{ 1 Screw Plate B and 1 pair Dies $\frac{3}{8}^{16}, \frac{1}{2}^{13}, \frac{5}{8}^{11}, \frac{3}{4}^{10}$	}	11.00
	{ 1 Plug Tap $\frac{3}{8}^{16}, \frac{1}{2}^{13}, \frac{5}{8}^{11}, \frac{3}{4}^{10}$		
	With 1 Tap Wrench each A and B		18.00
B <sup>3</sup>	{ 1 Screw Plate B and 1 pair Dies each $\frac{1}{4}^{20}, \frac{3}{8}^{16}, \frac{1}{2}^{13}, \frac{5}{8}^{11}, \frac{3}{4}^{10}, \frac{7}{8}^9$	}	14.75
	{ 1 Plug Tap each $\frac{1}{4}^{20}, \frac{3}{8}^{16}, \frac{1}{2}^{13}, \frac{5}{8}^{11}, \frac{3}{4}^{10}, \frac{7}{8}^9$		
	With 1 Tap Wrench each A and B		21.75
C <sup>2</sup>	{ 1 Screw Plate C and 1 pair Dies $\frac{1}{2}^{13}, \frac{5}{8}^{11}, \frac{3}{4}^{10}, \frac{7}{8}^9$	}	14.25
	{ 1 Plug Tap each $\frac{1}{2}^{13}, \frac{5}{8}^{11}, \frac{3}{4}^{10}, \frac{7}{8}^9$		
	With 1 Tap Wrench B		17.25
C <sup>3</sup>	{ 1 Screw Plate C and 1 pair Dies each $\frac{3}{8}^{16}, \frac{1}{2}^{13}, \frac{5}{8}^{11}, \frac{3}{4}^{10}, \frac{7}{8}^9, 1^8$	}	19.20
	{ 1 Plug Tap each $\frac{3}{8}^{16}, \frac{1}{2}^{13}, \frac{5}{8}^{11}, \frac{3}{4}^{10}, \frac{7}{8}^9, 1^8$		
	With 1 Tap Wrench each A and B		26.25
D <sup>2</sup>	{ 1 Screw Plate D and 1 pair Dies each $\frac{7}{8}^9, 1^8, 1\frac{1}{8}^7, 1\frac{1}{4}^7$	}	20.10
	{ 1 Plug Tap each $\frac{7}{8}^9, 1^8, 1\frac{1}{8}^7, 1\frac{1}{4}^7$		
	With 1 Tap Wrench C		25.10
D <sup>3</sup>	{ 1 Screw Plate D and 1 pair Dies $\frac{7}{8}^9, 1^8, 1\frac{1}{8}^7, 1\frac{1}{4}^7, 1\frac{3}{8}^6$	}	26.00
	{ 1 Plug Tap each $\frac{7}{8}^9, 1^8, 1\frac{1}{8}^7, 1\frac{1}{4}^7, 1\frac{3}{8}^6$		
	With 1 Tap Wrench C		31.00

U. S. Form of thread always furnished unless otherwise ordered.

For illustration of these Screw Plates see No. 153 on page 334.

## ADJUSTABLE TAP WRENCHES.

## No. 155.

## No. 156.

1, A, B, & C  
Wrenches.

D, E, & F  
have handles that  
screw into body  
similar to 151 on  
Page 334.



Nos.

- |   |   |   |                          |
|---|---|---|--------------------------|
| 0 | { | Fitting Taps from $\frac{1}{16}$ to $\frac{1}{4}$ inclu.; whole length $5\frac{1}{2}$ in. } | Price<br>Each.<br>\$1.60 |
|   |   | Fitting Squares from $\frac{1}{16}$ to $\frac{3}{8}$ inch inclusive. . . . }                |                          |

## No. 156.

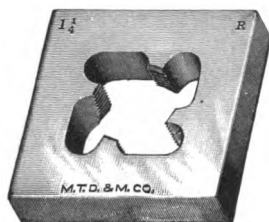
- |   |   |  |        |
|---|---|--|--------|
| 1 | { | Fitting Taps from $\frac{1}{8}$ to $\frac{3}{8}$ inclusive; whole length $8\frac{1}{2}$ " }                  | \$2.50 |
|   |   | Fitting Reamers from $\frac{1}{8}$ to $\frac{1}{2}$ inclusive . . . . }                                      |        |
| A | { | Fitting Taps from $\frac{1}{4}$ to $\frac{3}{8}$ inclu.; whole length 13 in. }                               | 3.00   |
|   |   | Fitting Reamers from $\frac{1}{4}$ to $\frac{3}{4}$ inclusive . . . . }                                      |        |
| B | { | Fitting Squares from $\frac{1}{32}$ to $\frac{3}{8}$ inclusive . . . . }                                     | 4.00   |
|   |   | Fitting Taps from $\frac{1}{2}$ to 1 inclu.; whole length 18 in. }   |        |
| C | { | Fitting Reamers from $\frac{3}{8}$ to $1\frac{1}{2}$ inclusive . . . . }                                     | 5.00   |
|   |   | Fitting Squares from $\frac{1}{4}$ to $\frac{3}{4}$ inclusive . . . . }                                      |        |
| D | { | Fitting Taps from $\frac{7}{8}$ to $1\frac{1}{2}$ inclu.; whole length 23 in. }                              | 15.00  |
|   |   | Fitting Reamers from $\frac{1}{2}$ to $1\frac{1}{2}$ inclusive . . . . }                                     |        |
| E | { | Fitting Squares from $\frac{1}{4}$ to $1\frac{1}{2}$ inclusive . . . . }                                     | 47.50  |
|   |   | Fitting Taps from $1\frac{1}{4}$ to $2\frac{1}{8}$ inclusive; whole length 47 $\frac{1}{2}$ inches . . . . } |        |
| F | { | Fitting Reamers from $1\frac{1}{8}$ to $2\frac{1}{8}$ inclusive . . . . }                                    | 62.50  |
|   |   | Fitting Squares from $1\frac{1}{4}$ to $2\frac{1}{2}$ inclusive; whole length 50 inches . . . . }            |        |
|   |   | Fitting Taps from $2\frac{1}{4}$ to $3\frac{1}{8}$ inclusive; whole length 56 inches . . . . }               |        |
|   |   | Fitting Reamers from $2\frac{1}{8}$ to 3 inclusive . . . . }   |        |
|   |   | Fitting Squares from $1\frac{1}{4}$ to 2 inclusive . . . . }   |        |

## No. 158.



## No. 1 SET IN MOROCCO CASE.

The set complete, with 6 pairs of Dies, 6 Taps and Tap Wrench, in Morocco case, \$6.75  
 Sizes of Taps and Dies  $\frac{1}{16}$ ,  $\frac{1}{8}$ ,  $\frac{1}{4}$ ,  $\frac{3}{8}$ ,  $\frac{1}{2}$ ,  $\frac{3}{4}$ ,  $\frac{7}{8}$ ,  $1$ ,  $1\frac{1}{8}$ ,  $1\frac{1}{4}$ ,  $1\frac{1}{2}$ ,  $1\frac{3}{4}$ ,  $2$ .

**No. 159.****SOLID PIPE DIES**Standard Taper is  $\frac{3}{4}$  inch to the foot.

Cutting Size Pipe, Inches.	Size of Square, Inches.	Thickness, Inches.	Price Each.
* $\frac{1}{8}$ , $\frac{1}{4}$ , $\frac{3}{8}$ , $\frac{1}{2}$	2	$\frac{1}{2}$	\$1.50
* $\frac{1}{4}$ , * $\frac{3}{8}$	2	$\frac{5}{8}$	2.00
* $\frac{1}{2}$	2	$\frac{3}{4}$	2.00
* $\frac{1}{4}$ , * $\frac{3}{8}$	$2\frac{3}{8}$	$\frac{5}{8}$	2.00
* $\frac{1}{4}$ , * $\frac{3}{8}$ , * $\frac{1}{2}$ , * $\frac{3}{4}$ , 1	$2\frac{3}{8}$	$\frac{3}{4}$	2.00
*1	$2\frac{3}{8}$	1	2.00
* $\frac{1}{4}$ , * $\frac{3}{8}$	$2\frac{1}{2}$	$\frac{5}{8}$	2.00
* $\frac{1}{4}$ , * $\frac{3}{8}$ , * $\frac{1}{2}$ , * $\frac{3}{4}$ , 1	$2\frac{1}{2}$	$\frac{3}{4}$	2.00
*1	$2\frac{1}{2}$	1	2.00
* $\frac{3}{4}$ , 1, $1\frac{1}{4}$	$2\frac{7}{8}$	$\frac{3}{4}$	2.50
*1, * $1\frac{1}{4}$	$2\frac{7}{8}$	1	2.50
* $\frac{3}{4}$ , 1, $1\frac{1}{4}$	3	$\frac{3}{4}$	2.50
*1, * $1\frac{1}{4}$	3	1	2.50
$1\frac{1}{4}$ , $1\frac{1}{2}$ , 2	$3\frac{7}{8}$	$\frac{7}{8}$	3.50
* $1\frac{1}{4}$ , * $1\frac{1}{2}$ , *2	$3\frac{7}{8}$	1	3.50
*2	$3\frac{7}{8}$	$1\frac{1}{8}$	3.50
$1\frac{1}{4}$ , $1\frac{1}{2}$ , 2	4	$\frac{7}{8}$	3.50
* $1\frac{1}{4}$ , * $1\frac{1}{2}$ , *2	4	1	3.50
*2	4	$1\frac{1}{8}$	3.50
$2\frac{1}{2}$ , 3	5	$1\frac{1}{4}$	9.00
* $2\frac{1}{2}$ , *3	5	$1\frac{1}{2}$	9.00

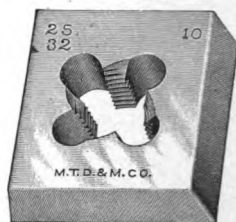
\*These Dies are thick enough to cut to Briggs' Standard.

Pipe Dies are furnished either Right or Left hand at same prices.

Cutting Size, Inches.	No. of Threads to Inch, U. S. S.	Outside Dimensions.		Price Each.
		Size of Square, Inches.	Thickness Inches.	
$\frac{1}{4}$	20	$2\frac{1}{4}$	$\frac{1}{2}$	\$1.80
$\frac{5}{16}$	18	$2\frac{1}{4}$	$\frac{1}{2}$	1.80
$\frac{3}{8}$	16	$2\frac{1}{4}$	$\frac{1}{2}$	1.80
$\frac{7}{16}$	14	$2\frac{1}{4}$	$\frac{1}{2}$	1.80
$\frac{1}{2}$	13	$2\frac{1}{4}$	$\frac{3}{4}$	1.80
$\frac{9}{16}$	12	$2\frac{1}{4}$	$\frac{3}{4}$	1.90
$\frac{5}{8}$	11	$2\frac{1}{4}$	$\frac{3}{4}$	2.00
$\frac{11}{16}$	11	$2\frac{1}{4}$	$\frac{3}{4}$	2.15
$\frac{3}{4}$	10	$2\frac{1}{4}$	$\frac{3}{4}$	2.25
$\frac{13}{16}$	10	$2\frac{1}{4}$	$\frac{3}{4}$	2.30
$\frac{7}{8}$	9	$2\frac{1}{4}$	$\frac{3}{4}$	2.40
$\frac{15}{16}$	9	$2\frac{1}{4}$	$\frac{3}{4}$	2.55
1	8	$2\frac{1}{4}$	$\frac{3}{4}$	2.70
$1\frac{1}{8}$	7	3	1	3.00
$1\frac{1}{4}$	7	3	1	3.30
$1\frac{3}{8}$	6	3	1	3.60
$1\frac{1}{2}$	6	3	1	3.90

### No. 160. SOLID DIES.

FOR BOYNTON & PLUM-  
MER'S BOLT CUTTERS.



U. S. form of thread  
always furnished unless  
otherwise ordered.

These Dies are made with bevelled edges and fit the Bolt Cutters made by Boynton & Plummer of Worcester, Mass.

Dies  $2\frac{1}{4}$  inches square fit the No. 2 Machine.

Dies 3 inches square fit the No. 3 Machine.

All sizes and threads not listed will be considered special and subject to special prices.

They are furnished for rough iron  $\frac{1}{4}$  over size from  $\frac{1}{4}$  to  $\frac{1}{16}$  inch inclusive;  $\frac{1}{32}$  over size from  $\frac{1}{4}$  to  $1\frac{1}{2}$  inches inclusive at regular prices.

No. 161. MACHINE OR SOLID BOLT DIES.		Cutting Size, Inches.	No. of Threads to Inch, U. S. S.	Outside Dimensions.		Price Each.
				Size of Square, Inches.	Thickness, Inches.	
		$\frac{1}{4}$	20	$2\frac{1}{2}$	$\frac{1}{2}$	\$1.80
		$\frac{5}{16}$	18	$2\frac{1}{2}$	$\frac{1}{2}$	1.80
		$\frac{3}{8}$	16	$2\frac{1}{2}$	$\frac{1}{2}$	1.80
		$\frac{7}{16}$	14	$2\frac{1}{2}$	$\frac{1}{2}$	1.80
		$\frac{1}{2}$	13	$2\frac{1}{2}$	$\frac{3}{4}$	1.80
		$\frac{9}{16}$	12	$2\frac{1}{2}$	$\frac{3}{4}$	1.90
		$\frac{5}{8}$	11	$2\frac{1}{2}$	$\frac{3}{4}$	2.00
		$\frac{11}{16}$	11	$2\frac{1}{2}$	$\frac{3}{4}$	2.15
		$\frac{3}{4}$	10	$2\frac{1}{2}$	$\frac{3}{4}$	2.20
		$\frac{13}{16}$	10	$2\frac{1}{2}$	$\frac{3}{4}$	2.30
		$\frac{15}{16}$	9	$2\frac{1}{2}$	$\frac{3}{4}$	2.40
		1	9	$2\frac{1}{2}$	$\frac{3}{4}$	2.55
		$1\frac{1}{8}$	8	$2\frac{1}{2}$	1	2.70
		$1\frac{1}{4}$	7	$2\frac{1}{2}$	1	3.00
		$1\frac{3}{8}$	7	$2\frac{1}{2}$	1	3.30
		$1\frac{1}{2}$	6	$2\frac{1}{2}$	1	3.60
These Dies are furnished for rough iron $\frac{1}{64}$ over size from $\frac{1}{4}$ to $\frac{5}{8}$ inch inclusive; $\frac{1}{32}$ over size from $\frac{1}{4}$ to 2 inches inclusive.		$1\frac{1}{2}$	6	3	1	3.90
		$1\frac{5}{8}$	$5\frac{1}{2}$	3	1	4.20
		$1\frac{3}{4}$	5	3	$1\frac{1}{4}$	5.40
		$1\frac{7}{8}$	5	$3\frac{1}{2}$	$1\frac{1}{2}$	6.50
		2	$4\frac{1}{2}$	$3\frac{1}{2}$	2	7.50

These Dies are furnished  
for rough iron  $\frac{1}{64}$  over size  
from  $\frac{1}{4}$  to  $\frac{5}{8}$  inch inclusive;  
 $\frac{1}{32}$  over size from  $\frac{1}{4}$  to 2  
inches inclusive.

U. S. form of thread  
always furnished unless  
otherwise ordered.



## CATALOGUE INDEX.

---

DRILL CASES, . . . . .	1 - 5
SOCKETS, . . . . .	6 - 12
DRILLS, . . . . .	13 - 151
ARBORS, . . . . .	152 - 159
CHUCKS, . . . . .	160 - 162
REAMERS, . . . . .	163 - 243
COUNTERSINKS AND COUNTERBORES, . . . . .	244 - 252
NDRELS AND GAUGES, . . . . .	253 - 267
LING CUTTERS, . . . . .	268 - 309
S, DIES AND SCREW PLATES, . . . . .	310 - 338

# APPENDIX.

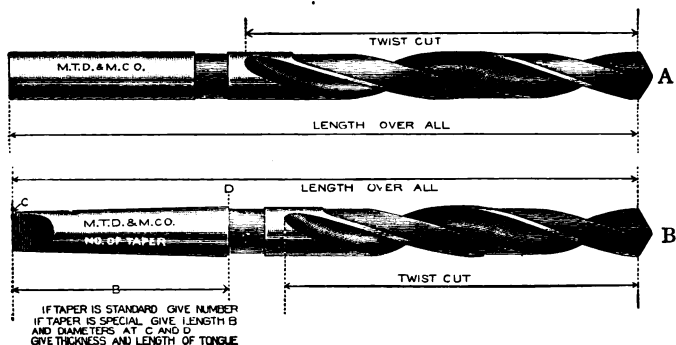
On the following pages will be found information that has been distributed throughout our former catalogues and which we now condense to make it easier for reference. We have also added other information which we trust will be of value to all our customers.

MORSE TWIST DRILL & MACHINE CO.

---

## INDEX.

DRILLS, . . . . .	I to XI
REAMERS, . . . . .	XII
TAPS AND DIES, . . . . .	XIII to XXI
CUTTERS, . . . . .	XXII to XXIV
MISCELLANEOUS INFORMATION, . . . . .	XXV to XXVIII



## SUGGESTIONS FOR ORDERING DRILLS.

**REGULAR DRILLS.**—Always order by catalogue number.

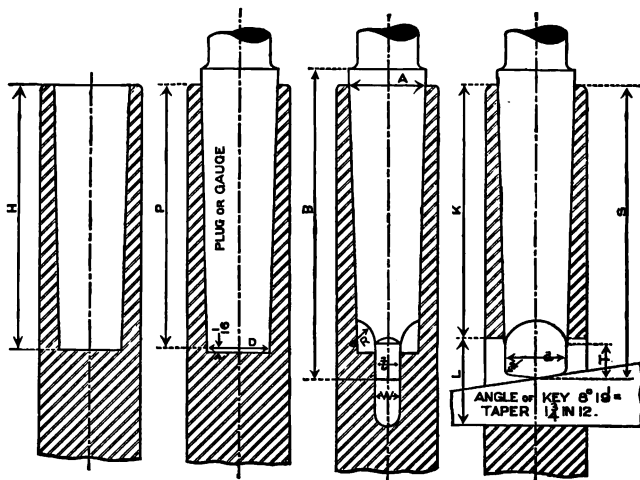
**SPECIAL DRILLS.**—Refer to the catalogue number for general style of tool required, giving also the following information:—

**SPECIAL STRAIGHT SHANK DRILLS.**—Give length over all and length of twist cut. See sketch A.

**SPECIAL MORSE TAPER SHANK DRILLS.**—Give length over all and length of twist cut. See sketch B. If a special taper shank is required, give diameter at C and D and length. See sketch B. If the shank has a tang give thickness and length. If no tang so state on the order.

We will gladly furnish copies of this page to any of our customers who desire them for distribution.

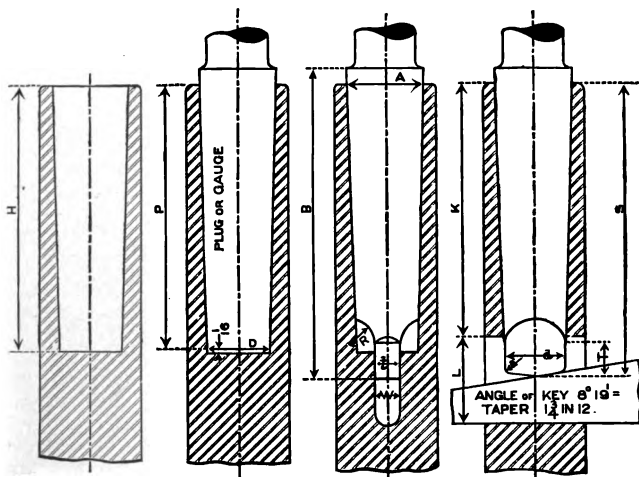
# MORSE TAPERS.



Number of Taper	Diam. of Plug at small End	Diam. at End of Socket	SHANK		Depth of Hole	Standard Plug Depth	TONGUE					KEYWAY			Taper per Foot	Taper per Inch	Number of Key
			Shank Depth	Whole Length of Shank			Thickness of Tongue	Length of Tongue	Rad. of Mill for Tongue	Diameter of Tongue	Radius of Tongue	Width of Keyway	Length of Keyway	End of Socket to Keyway			
	D	A	B	S	H	P	t	T	R	d	a	W	L	K			
0	.252	.3561	2 $\frac{1}{32}$	2 $\frac{7}{32}$	2 $\frac{1}{32}$	2	$\frac{5}{32}$	$\frac{1}{4}$	$\frac{5}{32}$	.235	.04	.160	1 $\frac{1}{8}$	1 $\frac{1}{8}$	.625	.05208	0
1	.369	.475	2 $\frac{9}{16}$	2 $\frac{1}{8}$	2 $\frac{3}{8}$	2 $\frac{1}{8}$	$\frac{11}{16}$	$\frac{3}{8}$	$\frac{1}{8}$	.343	.05	.213	$\frac{3}{4}$	2 $\frac{1}{8}$	.600	.05	1
2	.572	.700	3 $\frac{1}{8}$	2 $\frac{1}{8}$	2 $\frac{5}{8}$	2 $\frac{9}{16}$	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{2}$	.06	.260	$\frac{3}{8}$	2 $\frac{3}{4}$	.602	.05016	2
3	.778	.938	3 $\frac{7}{8}$	3 $\frac{1}{4}$	3 $\frac{1}{4}$	3 $\frac{3}{8}$	$\frac{5}{8}$	$\frac{1}{2}$	$\frac{3}{8}$	$\frac{3}{2}$	.08	.322	1 $\frac{1}{8}$	3 $\frac{1}{8}$	.602	.05016	3
4	1.020	1.231	4 $\frac{7}{8}$	4 $\frac{5}{8}$	4 $\frac{3}{8}$	4 $\frac{1}{8}$	$\frac{3}{2}$	$\frac{5}{8}$	$\frac{1}{8}$	$\frac{3}{2}$	.10	.478	1 $\frac{1}{4}$	3 $\frac{3}{8}$	.623	.05191	4
5	1.475	1.748	6 $\frac{1}{8}$	5 $\frac{7}{8}$	5 $\frac{1}{4}$	5 $\frac{3}{8}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{3}{8}$	1 $\frac{1}{2}$	.12	.635	1 $\frac{1}{2}$	4 $\frac{1}{8}$	.630	.0525	5
6	2.116	2.494	8 $\frac{9}{16}$	8 $\frac{1}{4}$	7 $\frac{3}{8}$	7 $\frac{1}{4}$	$\frac{3}{4}$	1 $\frac{1}{8}$	$\frac{1}{2}$	2	.15	.760	1 $\frac{3}{4}$	7	.626	.05216	6
7	2.750	3.270	11 $\frac{5}{8}$	11 $\frac{1}{4}$	10 $\frac{3}{8}$	10	1 $\frac{1}{8}$	1 $\frac{3}{8}$	$\frac{3}{4}$	2 $\frac{5}{8}$	.18	1.135	2 $\frac{3}{8}$	9 $\frac{1}{4}$	.625	.05208	7

## MORSE TAPERS

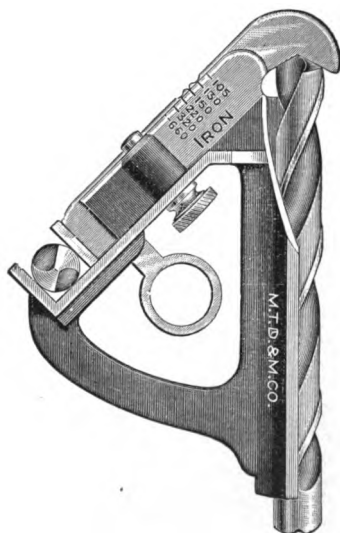
## SHORT SHANKS



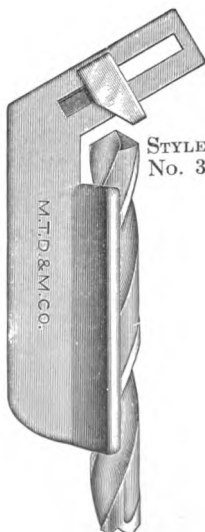
Number of Taper.	Diam. of Plug at Small End. D	Diam. at End of Socket. A	SHANK		Depth of Hole. H	Standard Plug Depth. P	TONGUE.				KEYWAY				Taper per Foot.	Taper per Inch.	Number of Key.
			Shank Depth. B	Whole Length of Shank. S			Thickness of Tongue. t	Length of Tongue. T	Rad. of Mill for Tongue. R	Diameter of Tongue. d	Radius of Tongue. a	Width of Keyway. W	Length of Keyway. L	End of Socket to Keyway. K			
0	.271	.356	1 $\frac{3}{16}$	1 $\frac{3}{16}$	1 $\frac{3}{16}$	1 $\frac{3}{16}$	.186 .188 .249	$\frac{1}{4}$	$\frac{1}{16}$	.258	$\frac{3}{16}$	.193 .196 .260	$\frac{5}{16}$	1 $\frac{3}{16}$	.625	.05208	0
1	.388	.475	2 $\frac{1}{16}$	2	1 $\frac{11}{16}$	1 $\frac{3}{4}$	.251 .374	$\frac{1}{8}$	$\frac{1}{4}$	.371	$\frac{1}{8}$	.263 .385	$\frac{1}{2}$	1 $\frac{3}{16}$	.600	.050	1
2	.600	.700	2 $\frac{1}{8}$	2 $\frac{3}{8}$	2 $\frac{1}{8}$	2	.376 .499	$\frac{1}{8}$	$\frac{3}{16}$	.575	$\frac{1}{8}$	.388 .512	1 $\frac{1}{8}$	1 $\frac{3}{16}$	.602	.05016	2
3	.816	.938	3 $\frac{1}{8}$	2 $\frac{11}{16}$	2 $\frac{1}{2}$	2 $\frac{1}{8}$	.501 .624	$\frac{1}{8}$	$\frac{1}{8}$	.783	$\frac{3}{16}$	.516 .637	1 $\frac{1}{8}$	2 $\frac{1}{16}$	.602	.05016	3
4	1.062	1.231	4 $\frac{1}{16}$	3 $\frac{11}{16}$	3 $\frac{1}{8}$	3 $\frac{1}{4}$	.626 .999	$\frac{5}{8}$	$\frac{3}{8}$	1.023	$\frac{3}{16}$	.641 1.012	1 $\frac{1}{2}$	2 $\frac{11}{16}$	.623	.05191	4
5	1.532	1.748	5 $\frac{1}{16}$	4 $\frac{11}{16}$	4 $\frac{1}{8}$	4 $\frac{1}{8}$	1.001 1.248	$\frac{3}{4}$	$\frac{1}{2}$	1.483	$\frac{1}{8}$	1.016 1.263	2	3 $\frac{11}{16}$	.630	.0525	5
6	2.201	2.494	7 $\frac{1}{16}$	6 $\frac{3}{4}$	5 $\frac{3}{4}$	5 $\frac{1}{8}$	1.251 1.623	1 $\frac{1}{8}$	$\frac{5}{8}$	2.128	$\frac{1}{8}$	1.268 1.639	2 $\frac{3}{4}$	5 $\frac{1}{8}$	.626	.05216	6
7	2.857	3.270	9 $\frac{1}{16}$	9 $\frac{1}{8}$	8 $\frac{1}{8}$	7 $\frac{11}{16}$	1.627	1 $\frac{1}{2}$	$\frac{3}{4}$	2.769	$\frac{1}{8}$	1.644	3 $\frac{3}{8}$	7 $\frac{1}{8}$	.625	.05208	7

# GAUGES FOR GRINDING DRILLS

STYLE No. 1



STYLE No. 2

STYLE  
No. 3STYLE  
No. 4

## GRINDING TWIST DRILLS.

Few operations on tools in the shop are more frequently disappointing than the grinding or sharpening of drills. That the cutting edges have a proper and uniform angle with the longitudinal axis of the drill, (see Fig. 6) having them of exactly equal length, and the lips of the drill well and sufficiently backed off or cleared, are points generally understood as requisite to the satisfactory performance of a drill, though not always attained. Practical suggestions for the grinding of drills have been published from time to time. We append in part from these, hoping they will be found useful. "If the clearance of a drill is insufficient or imperfect it will not cut. When force is applied it resists the power of the drilling machine, and is crushed or split. It is well to start a drill, after grinding, by hand, observing the character of the chips, which should characterize a clean cutting tool. In wrought metal the chip will sometimes attain a length of several feet. Prof. Sweet suggests that the rear of the lip of a drill be removed, as shown by the cut, No. 1; this makes the cutting edge much like a flat drill. Drills properly made have their

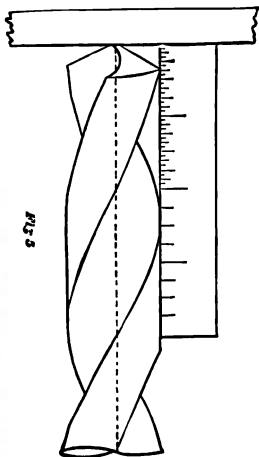


Fig. 1



Fig. 2

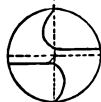


Fig. 3

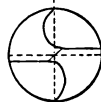


Fig. 4

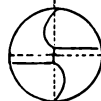


Fig. 5

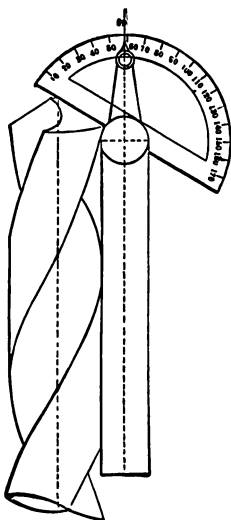


Fig. 6

## GRINDING TWIST DRILLS—CONTINUED.

cutting edges straight when ground to a proper angle, which is  $59^\circ$ , as shown in cut No. 6. Grinding to less angle leaves the lip hooking, and is likely to produce a crooked and irregular hole. The grinding lines to a drill are placed slightly above the center, to allow for the proper angle of point, which is an important factor. This angle is an index to the clearance. If the angle is too much, the drill cuts rank; if not enough, the drill may not cut. Fig. 2 shows a proper angle. In Fig. 3 the angle is too sharp. In Fig. 4 the angle runs backward, and shows the want of clearance. An effective method of determining the clearance is to set the point of the drill on a plane surface, holding a scale as shown in cut No. 5; by revolving the drill its clearance is shown, as well as the height of the cutting lips, which should be equal; also the cutting edges should be of exactly equal length,—any inequality of lengths doubles itself in work. To strengthen the drill, the center is made thicker toward the shank. As the drill is shortened through use, the centre shows thicker, and will work hard in drilling. To overcome this, the center should be thinned, care being taken to remove an equal amount of stock on each side, and so keep the point central. In grinding a drill preserve the original form, which usually will insure rapid and satisfactory work."

## SPEED AND FEED OF DRILLS.

OF  
CARBON STEEL.

Diam., Inches.	Revolutions Per Minute.			Diam., Inches.	Revolutions Per Minute.		
	Wrought Iron and Steel.	Cast Iron.	Brass.		Wrought Iron and Steel.	Cast Iron.	Brass.
$\frac{1}{16}$	1833	2320	3667	$\frac{3}{4}$	132	178	306
$\frac{1}{8}$	917	1160	1833	$\frac{1}{2}$	112	165	282
$\frac{3}{16}$	611	773	1222	$\frac{7}{8}$	105	153	262
$\frac{1}{4}$	458	580	917	$\frac{1}{8}$	98	143	244
$\frac{5}{16}$	342	465	733	1	90	134	229
$\frac{3}{8}$	285	386	611	$1\frac{1}{16}$	80	126	216
$\frac{7}{16}$	244	331	524	$1\frac{1}{8}$	75	119	204
$\frac{1}{2}$	214	290	458	$1\frac{3}{16}$	71	113	193
$\frac{9}{16}$	176	238	407	$1\frac{1}{4}$	67	107	183
$\frac{5}{8}$	159	214	367	$1\frac{5}{16}$	64	102	175
$\frac{1}{2}$	144	194	333	$1\frac{3}{8}$	61	97	167

For continuation of Table and Feeds see page vii.



## SPEED AND FEED OF DRILLS OF CARBON STEEL

Diameter Inches	Revolutions per Minute			Diameter Inches	Revolutions per Minute		
	Wrought Iron and Steel	Cast Iron	Brass		Wrought Iron and Steel	Cast Iron	Brass
$1\frac{7}{16}$	58	93	159	$2\frac{1}{8}$	40	63	108
$1\frac{1}{2}$	56	89	153	$2\frac{1}{4}$	38	59	102
$1\frac{1}{8}$	54	86	147	$2\frac{3}{8}$	36	56	96
$1\frac{5}{8}$	52	82	141	$2\frac{1}{2}$	34	53	92
$1\frac{1}{4}$	50	79	136	$2\frac{5}{8}$	32	51	87
$1\frac{3}{4}$	48	76	131	$2\frac{3}{4}$	30	49	83
$1\frac{7}{8}$	45	71	122	$2\frac{7}{8}$	28	47	80
2	42	67	115	3	26	45	76

### HIGH SPEED STEEL.

$\frac{1}{8}$	1832	2440	Periphery Speed 100 to 140 feet per minute.	$1\frac{1}{8}$	204	255	Periphery Speed 100 to 140 feet per minute.
$\frac{3}{16}$	1221	1627		$1\frac{3}{16}$	193	242	
$\frac{1}{4}$	916	1220		$1\frac{1}{4}$	183	229	
$\frac{5}{16}$	733	976		$1\frac{5}{16}$	174	219	
$\frac{3}{8}$	611	813		$1\frac{3}{8}$	166	209	
$\frac{7}{16}$	523	697		$1\frac{7}{16}$	160	199	
$\frac{1}{2}$	458	610		$1\frac{1}{2}$	153	191	
$\frac{9}{16}$	407	510		$1\frac{9}{16}$	143	184	
$\frac{5}{8}$	366	459		$1\frac{5}{8}$	138	176	
$\frac{11}{16}$	333	417		$1\frac{3}{4}$	127	164	
$\frac{3}{4}$	305	383		$1\frac{7}{8}$	112	153	
$\frac{13}{16}$	282	353		2	104	143	
$\frac{7}{8}$	262	328		$2\frac{1}{8}$	95	126	
$\frac{15}{16}$	244	306		$2\frac{1}{4}$	89	118	
1	229	287		$2\frac{3}{8}$	80	112	
$1\frac{1}{16}$	215	270		$2\frac{1}{2}$	76	106	

### FEED PER REVOLUTION.

#### CARBON STEEL DRILLS.

#### HIGH SPEED STEEL DRILLS

.005"	$\frac{1}{4}"$	.006"
.009"	$\frac{5}{8}"$	.010"
.012"	1	.015"
.015"	2	.020"

The above Speeds and Feeds are approximate for average conditions. They can be greatly exceeded under some conditions but under others both would have to be reduced.

# DECIMAL EQUIVALENTS OF NOMINAL SIZES OF DRILLS.

Inch.	M.M.	Wire Gauge	Decimals of an Inch.	Inch.	M.M.	Wire Gauge	Decimals of an Inch.	Inch.	M.M.	Wire Gauge	Decimals of an Inch.
$\frac{1}{64}$		80	.0135			58	.042		2.1		.0826
		79	.0145			57	.043		2.15		.0846
			.015625	1.1			.043307			44	.086
	.4		.01574	1.15			.0453		2.2		.0866
		78	.016			56	.0465		2.25		.0886
		77	.018	$\frac{3}{8}$			.046875			43	.089
	.5		.01968	1.2			.047244		2.3		.0905
		76	.020	1.25			.0492		2.35		.0925
		75	.021	1.3			.051181			42	.0935
	.55		.0216			55	.052	$\frac{3}{32}$			.09375
		74	.0225	1.35			.0532		2.4		.09448
	.6		.02362			54	.055			41	.096
		73	.024	1.4			.055118		2.45		.0965
		72	.025	1.45			.0571			40	.098
	.65		.0256	1.5			.05905		2.5		.098425
$\frac{1}{32}$		71	.026			53	.0595			39	.0995
	.7		.02756	1.55			.061			38	.1015
		70	.028	$\frac{1}{16}$			.0625		2.6		.102362
		69	.02925	1.6			.06299			37	.104
	.75		.0296			52	.0635		2.7		.1063
		68	.031	1.65			.065			36	.1065
			.03125	1.7			.066929	$\frac{7}{64}$			.109375
	.8		.031496			51	.067			35	.11
		67	.032	1.75			.0689		2.8		.11024
		66	.033			50	.07			34	.111
	.85		.0335	1.8			.070866			33	.113
		65	.035	1.85			.0728		2.9		.11417
	.9		.03543			49	.073			32	.116
		64	.036	1.9			.0748		3		.11811
		63	.037			48	.076			31	.12
$\frac{1}{16}$	.95		.0374	1.95			.0768		3.1		.12205
		62	.038	$\frac{5}{8}$			.078125	$\frac{1}{8}$			.125
		61	.039			47	.0785		3.2		.12598
	1		.03937	2			.07874			30	.1285
		60	.04	2.05			.0807		3.3		.12992
		59	.041			46	.081		3.4		.13386
1.05			.0413			45	.082			29	.136

# DECIMAL EQUIVALENTS OF NOMINAL SIZES OF DRILLS.

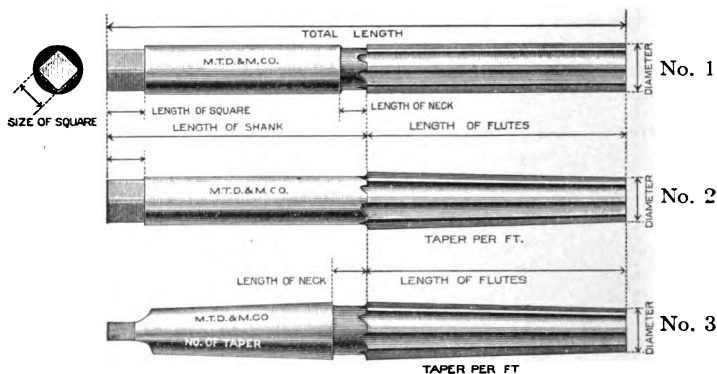
Inch.	M.M.	Wire Gauge	Decimals of an Inch.	Inch.	M.M.	Wire Gauge	Decimals of an Inch.	Inch.	M.M.	Letter Sizes.	Decimals of an Inch.
$\frac{9}{64}$	3.5		.1378			10	.1935		6.6		.25984
		28	.1405			9	.196			G	.261
			.140625	5			.19685	6.7			.26377
	3.6		.14173			8	.199	$\frac{17}{64}$			.265625
		27	.144	5.1			.20079			H	.266
	3.7		.14567			7	.201	6.8			.26772
		26	.147	$\frac{13}{64}$			.203125	6.9			.27165
		25	.1495			6	.204			I	.272
	3.8		.14961	5.2			.20473	7			.27559
		24	.152			5	.2055			J	.277
$\frac{5}{32}$	3.9		.15354	5.3			.20866	7.1			.27952
		23	.154			4	.209			K	.281
			.15625	5.4			.2126	$\frac{9}{32}$			.28125
		22	.157			3	.213	7.2			.28347
	4		.15748	5.5			.21654	7.3			.2874
		21	.159	$\frac{7}{32}$			.21875			L	.29
		20	.161				.22047	7.4			.29133
	4.1		.16142	5.6		2	.221			M	.295
	4.2		.16536	5.7			.22441	7.5			.29528
		19	.166			1	.228	$\frac{1}{8}$			.296875
$\frac{11}{64}$	4.3		.16929					7.6			.29922
		18	.1695			Letter Sizes.				N	.302
			.171875	5.8			.22835	7.7			.30314
		17	.173	5.9			.23228	7.8			.30709
	4.4		.17323			A	.234	7.9			.31102
		16	.177	$\frac{15}{64}$			.234375	$\frac{5}{16}$			.3125
	4.5		.17717	6			.23622	8			.31496
		15	.18			B	.238			O	.316
	4.6		.1811	6.1			.24015	8.1			.3189
		14	.182			C	.242	8.2			.32284
$\frac{3}{16}$		13	.185	6.2			.2441	8.3			.3268
	4.7		.18504			D	.246			P	.323
			.1875	6.3			.24803	$\frac{21}{64}$			.328125
	4.8		.18898	$\frac{1}{4}$		E	.25	8.4			.3307
		12	.189				.25197			Q	.332
		11	.191	6.5			.25591	8.5			.33465
	4.9		.19291			F	.257	8.6			.33859

# DECIMAL EQUIVALENTS OF NOMINAL SIZES OF DRILLS.

Inch.	M. M.	Letter Sizes.	Decimals of an Inch.	Inch.	M. M.	Decimals of an Inch.	Inch.	M. M.	Decimals of an Inch.	
$\frac{11}{32}$	8.7	R	.339	$\frac{1}{2}$	12.5	.4921	$\frac{13}{16}$	21	.8125	
			.3425		13	.5	$\frac{53}{64}$		.82677	
			.34375			.51181	$\frac{27}{32}$		.828125	
	8.8	S	.3464	$\frac{33}{64}$		.515625		21.5	.84375	
			.348	$\frac{17}{32}$		.53125			.84646	
$\frac{23}{64}$	8.9		.3504	$\frac{35}{64}$	13.5	.5315	$\frac{55}{64}$		.859375	
	9		.3543			.546875		22	.86614	
	9.1	T	.358	$\frac{9}{16}$	14	.55118	$\frac{7}{8}$	22.5	.875	
			.3583			.5625			.88583	
	9.2		.359375	$\frac{37}{64}$	14.5	.57087	$\frac{57}{64}$	23	.890625	
			.36221			.578125			.90551	
	9.3	U	.3661	$\frac{19}{32}$	15	.59055	$\frac{29}{32}$	23.5	.90625	
			.368			.59375	$\frac{59}{64}$		.921875	
	$\frac{3}{8}$	9.4		.3701	$\frac{39}{64}$		.609375		24	.9252
		9.5		.37402	$\frac{5}{8}$	15.5	.61024	$\frac{15}{16}$		.9375
		9.6	V	.375			.625		24.5	.94488
				.377		.62992	$\frac{61}{64}$	.953125		
9.7			.37796	$\frac{11}{64}$	16	.640625		25	.9646	
$\frac{25}{64}$	9.8		.3819	$\frac{31}{32}$	16.5	.6496	$\frac{31}{32}$		.96875	
	9.8		.38583			.65625		.98425		
	9.9	W	.386	$\frac{13}{64}$	17	.66929	$\frac{63}{64}$	25.5	.984375	
			.3898			.671875	1		1.	
	10		.390625	$\frac{11}{16}$		.6875		1.004		
$\frac{13}{32}$	10.5	X	.3937	$\frac{15}{64}$	17.5	.689	$1\frac{1}{64}$	26	1.015625	
			.397			.703125			1.02362	
	11	Y	.404	$\frac{17}{64}$	18	.70866	$1\frac{1}{32}$	26.5	1.03125	
			.40625			.71875			1.0433	
	$\frac{27}{64}$	11.5	Z	.413	$\frac{17}{64}$	18.5	.72835	$1\frac{3}{64}$	27	1.046875
.4134						.734375	$1\frac{1}{16}$	1.0625		
12			.421875	$\frac{3}{4}$	19	.74803		27.5	1.063	
			.43307			.75	$1\frac{5}{64}$		1.078125	
$\frac{7}{16}$		12		.4375	$\frac{19}{64}$	19.5	.765625		28	1.08268
.45276				.76772			$1\frac{3}{32}$	1.09375		
.453125				.78125				1.1024		
.46875				.7874			$1\frac{7}{64}$	1.109375		
$\frac{15}{32}$				.796875				1.122		
$\frac{31}{64}$			.47244	$\frac{61}{64}$	20.5	.8071	$1\frac{1}{8}$		1.125	

# DECIMAL EQUIVALENTS OF NOMINAL SIZES OF DRILLS.

Inch.	M. M.	Decimals of an Inch.	Inch.	M. M.	Decimals of an Inch.	Inch.	M. M.	Decimals of an Inch.
$1\frac{3}{4}$		1.140625		37	1.4567	$1\frac{3}{4}$		1.78125
	29	1.1417	$1\frac{1}{4}$		1.46875		45.5	1.79138
$1\frac{5}{32}$		1.15625		37.5	1.4764	$1\frac{5}{16}$		1.79687
	29.5	1.1614	$1\frac{3}{16}$		1.48437		46	1.811
$1\frac{1}{4}$		1.171875		38	1.4961	$1\frac{1}{2}$		1.8125
	30	1.1811	$1\frac{1}{2}$		1.5	$1\frac{3}{4}$		1.82812
$1\frac{3}{16}$		1.1875	$1\frac{3}{4}$		1.51562		46.5	1.83
	30.5	1.2008		38.5	1.51576	$1\frac{7}{8}$		1.84375
$1\frac{1}{2}$		1.203125	$1\frac{7}{8}$		1.53125		47	1.85047
$1\frac{3}{8}$		1.21875		39	1.5354	$1\frac{1}{4}$		1.85937
	31	1.2205	$1\frac{5}{8}$		1.54687		47.5	1.87016
$1\frac{5}{8}$		1.234375		39.5	1.5551	$1\frac{1}{2}$		1.875
	31.5	1.24016	$1\frac{9}{16}$		1.5625		48	1.88985
$1\frac{1}{4}$		1.25		40	1.5748	$1\frac{3}{4}$		1.89062
	32	1.2598	$1\frac{3}{4}$		1.57812	$1\frac{1}{2}$		1.90625
$1\frac{1}{2}$		1.26562	$1\frac{1}{2}$		1.59375		48.5	1.90945
	32.5	1.2795		40.5	1.5945	$1\frac{1}{4}$		1.92187
$1\frac{3}{8}$		1.28125	$1\frac{3}{8}$		1.60937		49	1.92913
$1\frac{1}{4}$		1.29687		41	1.6142	$1\frac{1}{8}$		1.9375
	33	1.2992	$1\frac{5}{8}$		1.625		49.5	1.9488
$1\frac{5}{16}$		1.3125		41.5	1.6338	$1\frac{3}{8}$		1.95312
	33.5	1.319	$1\frac{1}{4}$		1.64062		50	1.9685
$1\frac{3}{4}$		1.328125		42	1.6536	$1\frac{1}{2}$		1.96875
	34	1.3386	$1\frac{1}{2}$		1.65625	$1\frac{3}{4}$		1.98437
$1\frac{1}{2}$		1.34375	$1\frac{3}{4}$		1.67187		50.5	1.9882
	34.5	1.3583		42.5	1.6733	2		2.
$1\frac{3}{8}$		1.359375	$1\frac{1}{8}$		1.6875		51	2.0079
$1\frac{3}{8}$		1.375		43	1.6929	$2\frac{1}{4}$		2.0156
	35	1.378	$1\frac{5}{8}$		1.70312		51.5	2.0276
$1\frac{5}{16}$		1.39062		43.5	1.71259	$2\frac{1}{2}$		2.0312
	35.5	1.3977	$1\frac{3}{8}$		1.71875	$2\frac{3}{4}$		2.0468
$1\frac{1}{2}$		1.40625		44	1.7323		52	2.0473
	36	1.4173	$1\frac{1}{4}$		1.73437	$2\frac{1}{8}$		2.0625
$1\frac{3}{4}$		1.421875	$1\frac{3}{4}$		1.75		52.5	2.0670
	36.5	1.437		44.5	1.7519	$2\frac{5}{8}$		2.0781
$1\frac{7}{16}$		1.4375	$1\frac{1}{8}$		1.76562		53	2.0866
$1\frac{3}{8}$		1.45312		45	1.7717	$2\frac{3}{2}$		2.0937



## SUGGESTIONS FOR ORDERING REAMERS.

**REGULAR REAMERS.**—Always order by catalogue number.

**SPECIAL REAMERS.**—Refer to the catalogue number for general style of tool required, giving also the following information:—

**SPECIAL SOLID REAMERS.**—Give total length and length of flutes. See sketch No. 1.

**SPECIAL TAPER REAMERS.**—Give whole length, length of flutes, size at large and small ends of flutes; or size at one end and taper per foot. State whether style No. 2 or No. 3 is required. If style No. 3 give dimensions of taper shank or if Morse Taper is required state number.

**SPECIAL SHELL REAMERS.**—Give whole length and length of flutes. When these reamers are longer than catalogue lengths they are made with Straight Hole and diameter of hole should be given.

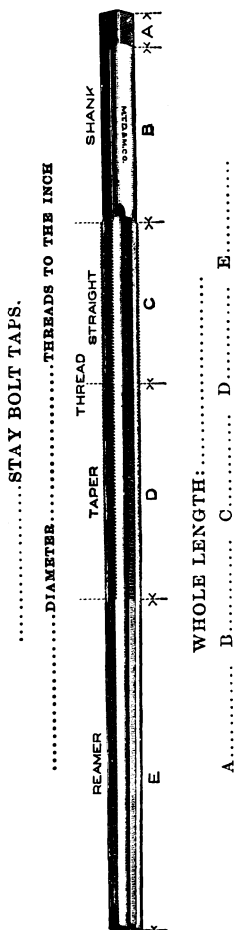
We will gladly furnish copies of this page to any of our customers who desire them for distribution.

## TO SHARPEN REAMERS.

**HAND REAMERS,** when dull through wear, should be stoned first on the face of the flutes then on top of the flutes. The stone should be always held perfectly flat with the face and clearance that the original shape of the flutes may be preserved.

**END CUTTING REAMERS** should be first ground on centres with a wheel, and then recleared to insure reaming a hole the same size of Reamer.

**THE NORTON Co.** make a Stone for the purpose, which is adapted and gives quicker results than any oil stone. The stone should be kept clean by the use of turpentine.



## SUGGESTIONS FOR ORDERING TAPS.

**REGULAR TAPS.** Always order by catalogue number. Unless specified to the contrary we fill all orders with U. S. form of thread.

**SPECIAL TAPS.** Give exact diameter of thread, whole length and length of thread, number of threads to the inch. Also state whether V, U. S. S., or Whitworth shape of thread is desired. Reference should also be made to catalogue number showing style.

When **HAND TAPS** are ordered state whether Taper, Plug or Bottoming.

For **STAY BOLT TAPS** give shape and number of threads to the inch, whole length and lengths of parts A, B, C, D, E, as shown by cut.

We will gladly furnish slips for ordering Stay Bolt Taps to any customer who desires them for distribution.

## SPECIAL DIES.

If for **SCREW PLATES**, give number of plate, size of die together with number of threads to the inch and shape of thread.

If **SOLID DIES**, give size, number and shape of thread, and square and thickness.

If **ROUND DIES**, give diameter and thickness and state whether split or solid.

If sizes of Taps and Dies cannot be accurately given, a plug showing what is required should be furnished.

TABLE FOR USE WITH  
SCREW THREAD MICROMETER CALIPER.

READING OF CALIPER.

FOR U. S. S. THREADS,  $D - \frac{.6495}{P}$ .      For "V" THREADS,  $D - \frac{.866}{P}$ .

U. S. STD. THREADS.				"V" THREADS			
Diameter	Pitch	Caliper Reading		Diameter	Pitch	Caliper Reading	
D	P	$D - \frac{.6495}{P}$	$\frac{.6495}{P}$	D	P	$D - \frac{.866}{P}$	$\frac{.866}{P}$
$\frac{1}{4}$	20	.2176	.0324	$\frac{1}{4}$	24	.2139	.0361
$\frac{5}{16}$	18	.2765	.0360	$\frac{1}{4}$	20	.2067	.0433
$\frac{3}{8}$	16	.3344	.0406	$\frac{5}{16}$	20	.2692	.0433
$\frac{7}{16}$	14	.3911	.0464	$\frac{5}{16}$	18	.2644	.0481
$\frac{1}{2}$	13	.4501	.0499	$\frac{3}{8}$	18	.3269	.0481
$\frac{9}{16}$	12	.5084	.0541	$\frac{3}{8}$	16	.3209	.0541
$\frac{5}{8}$	11	.566	.0590	$\frac{7}{16}$	16	.3834	.0541
$\frac{3}{4}$	10	.6851	.0649	$\frac{7}{16}$	14	.3756	.0619
$\frac{7}{8}$	9	.8029	.0721	$\frac{1}{2}$	14	.4381	.0619
1	8	.9188	.0812	$\frac{1}{2}$	13	.4334	.0666
$1\frac{1}{8}$	7	1.0322	.0928	$\frac{1}{2}$	12	.4278	.0722
$1\frac{1}{4}$	7	1.1572	.0928	$\frac{9}{16}$	14	.5006	.0619
$1\frac{3}{8}$	6	1.2668	.1082	$\frac{9}{16}$	12	.4903	.0722
$1\frac{1}{2}$	6	1.3918	.1082	$\frac{5}{8}$	11	.5463	.0787
$1\frac{5}{8}$	$5\frac{1}{2}$	1.507	.1180	$\frac{5}{8}$	10	.5384	.0866
$1\frac{3}{4}$	5	1.6201	.1299	$\frac{11}{16}$	10	.6009	.0866
$1\frac{7}{8}$	5	1.7451	.1299	$\frac{3}{4}$	10	.6634	.0866
2	$4\frac{1}{2}$	1.8557	.1443	$\frac{7}{8}$	9	.7788	.0962
$2\frac{1}{2}$	4	2.3376	.1624	1	8	.8918	.1082
3	$3\frac{1}{2}$	2.8145	.1855	$1\frac{1}{8}$	8	1.0168	.1082
$3\frac{1}{2}$	$3\frac{1}{4}$	3.3002	.1998	$1\frac{1}{4}$	7	1.1263	.1237
4	3	3.7835	.2165	$1\frac{1}{2}$	6	1.3557	.1443

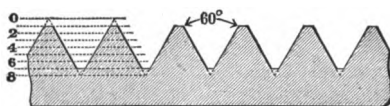
The right hand column gives the number to be subtracted from the diameter to obtain the caliper reading.

The figures in above table apply only to screws made accurately to standard size.

Taps are always made oversize, screws as well as taps, having the V Form of Thread are usually made considerably larger than the figures in above table.

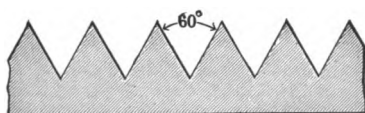


# UNITED STATES OR FRANKLIN INSTITUTE STANDARD.



Diam. of Tap, Inches.	No. of Threads to Inch.	Diam. of Tap, Inches.	No. of Threads to Inch.	Diam. of Tap, Inches.	No. of Threads to Inch.	Diam. of Tap, Inches.	No. of Threads to Inch.
$\frac{1}{4}$	20	1	8	$2\frac{1}{8}$	$4\frac{1}{2}$	$3\frac{1}{8}$	$3\frac{1}{2}$
$\frac{5}{16}$	18	$1\frac{1}{8}$	7	$2\frac{1}{4}$	$4\frac{1}{2}$	$3\frac{1}{4}$	$3\frac{1}{2}$
$\frac{3}{8}$	16	$1\frac{1}{4}$	7	$2\frac{3}{8}$	4	$3\frac{3}{8}$	$3\frac{1}{4}$
$\frac{7}{16}$	14	$1\frac{3}{8}$	6	$2\frac{1}{2}$	4	$3\frac{1}{2}$	$3\frac{1}{4}$
$\frac{1}{2}$	13	$1\frac{1}{2}$	6	$2\frac{5}{8}$	4	$3\frac{5}{8}$	$3\frac{1}{4}$
$\frac{9}{16}$	12	$1\frac{5}{8}$	$5\frac{1}{2}$	$2\frac{3}{4}$	4	$3\frac{3}{4}$	3
$\frac{5}{8}$	11	$1\frac{3}{4}$	5	$2\frac{7}{8}$	$3\frac{1}{2}$	$3\frac{7}{8}$	3
$\frac{3}{4}$	10	$1\frac{7}{8}$	5	3	$3\frac{1}{2}$	4	3
$\frac{7}{8}$	9	2	$4\frac{1}{2}$				

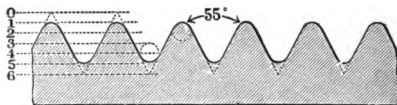
## TAP THREADS.—V THREAD.



Diam. of Tap, Inches.	No. of Threads to Inch.	Diam. of Tap, Inches.	No. of Threads to Inch.	Diam. of Tap, Inches.	No. of Threads to Inch.	Diam. of Tap, Inches.	No. of Threads to Inch.
$\frac{1}{4}$	20	1	8	2	$4\frac{1}{2}$	3	$3\frac{1}{2}$
$\frac{5}{16}$	18	$1\frac{1}{8}$	7	$2\frac{1}{8}$	$4\frac{1}{2}$	$3\frac{1}{8}$	$3\frac{1}{2}$
$\frac{3}{8}$	16	$1\frac{1}{4}$	7	$2\frac{1}{4}$	$4\frac{1}{2}$	$3\frac{1}{4}$	$3\frac{1}{2}$
$\frac{7}{16}$	14	$1\frac{3}{8}$	6	$2\frac{3}{8}$	$4\frac{1}{2}$	$3\frac{3}{8}$	$3\frac{1}{4}$
$\frac{1}{2}$	12	$1\frac{1}{2}$	6	$2\frac{1}{2}$	4	$3\frac{1}{2}$	$3\frac{1}{4}$
$\frac{5}{8}$	11	$1\frac{5}{8}$	5	$2\frac{5}{8}$	4	$3\frac{5}{8}$	$3\frac{1}{4}$
$\frac{3}{4}$	10	$1\frac{3}{4}$	5	$2\frac{3}{4}$	4	$3\frac{3}{4}$	3
$\frac{7}{8}$	9	$1\frac{7}{8}$	$4\frac{1}{2}$	$2\frac{7}{8}$	4	$3\frac{7}{8}$	3
						4	3

There is no recognized standard number of threads for diameters less than  $\frac{1}{4}$  inch.

## TAP THREADS.—WHITWORTH STANDARD.



Diam. of Tap, Inches.	No. of Threads to Inch.	Diam. of Tap, Inches.	No. of Threads to Inch.	Diam. of Tap, Inches.	No. of Threads to Inch.	Diam. of Tap, Inches.	No. of Threads to Inch.
$\frac{1}{4}$	20	1	8	2	$4\frac{1}{2}$	3	$3\frac{1}{2}$
$\frac{5}{16}$	18	$1\frac{1}{8}$	7	$2\frac{1}{8}$	$4\frac{1}{2}$	$3\frac{1}{8}$	$3\frac{1}{2}$
$\frac{3}{8}$	16	$1\frac{1}{4}$	7	$2\frac{1}{4}$	4	$3\frac{1}{4}$	$3\frac{1}{4}$
$\frac{7}{16}$	14	$1\frac{3}{8}$	6	$2\frac{3}{8}$	4	$3\frac{3}{8}$	$3\frac{1}{4}$
$\frac{1}{2}$	12	$1\frac{1}{2}$	6	$2\frac{1}{2}$	4	$3\frac{1}{2}$	$3\frac{1}{4}$
$\frac{5}{8}$	11	$1\frac{5}{8}$	5	$2\frac{5}{8}$	4	$3\frac{5}{8}$	$3\frac{1}{4}$
$\frac{3}{4}$	10	$1\frac{3}{4}$	5	$2\frac{3}{4}$	$3\frac{1}{2}$	$3\frac{3}{4}$	3
$\frac{7}{8}$	9	$1\frac{7}{8}$	$4\frac{1}{2}$	$2\frac{7}{8}$	$3\frac{1}{2}$	$3\frac{7}{8}$	3
						4	3

## ACME STANDARD.

## 29° THREAD.



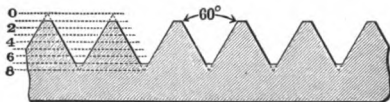
This Thread has been devised to take the place of the Square Thread. It has the same depth as the Square Thread, but is stronger, as the bottom of the thread is wider than the Square Thread. The sides of this Thread are at the same inclination as is now generally adopted in cutting Worms.

Taps and Dies to this Standard are made only to order, and prices will be given on application.

## TABLE OF THREAD PARTS.

No. of Threads, per Inch.	Depth of Thread.	Thickness at Top of Thread.	Width Space at Bottom of Thread.	Space at Top of Thread.	Thickness at Root of Thread.
1	.5100	.3707	.3655	.6293	.6345
$1\frac{1}{3}$	.3850	.2880	.2728	.4720	.4772
2	.2600	.1853	.1801	.3147	.3199
3	.1767	.1235	.1183	.2098	.2150
4	.1350	.0927	.0875	.1573	.1625
5	.1100	.0741	.0689	.1259	.1311
6	.0933	.0618	.0566	.1049	.1101
7	.0814	.0529	.0478	.0899	.0951
8	.0725	.0463	.0411	.0787	.0839
9	.0655	.0413	.0361	.0699	.0751
10	.0600	.0371	.0319	.0629	.0681

## A. S. M. E. STANDARD. FOR MACHINE SCREWS.



This standard for machine screws was recommended by the American Society of Mechanical Engineers at the Indianapolis meeting, May 28-31, 1907.

For full and complete details concerning this standard and the Engineers' recommendations, see their report, Volume 28, No. 9.

We are prepared to furnish machine screw taps made to these figures, see page 320.

### STANDARD SCREWS.

NOTE:—Maximum sizes given are the standard sizes.

Basic Size.		Outside Diameter.		Pitch Diameter.		Root Diameter.	
No.	O.D.—T.P.I.	Min.	Max.	Min.	Max.	Min.	Max.
0	.060-80	.0572	.0600	.0505	.0519	.0410	.0438
1	.073-72	.0700	.0730	.0625	.0640	.0520	.0550
2	.086-64	.0828	.0860	.0742	.0759	.0624	.0657
3	.099-56	.0955	.0990	.0857	.0874	.0721	.0758
4	.112-48	.1082	.1120	.0966	.0985	.0808	.0849
5	.125-44	.1210	.1250	.1082	.1102	.0910	.0955
6	.138-40	.1338	.1380	.1197	.1218	.1007	.1055
7	.151-36	.1466	.1510	.1308	.1330	.1097	.1149
8	.164-36	.1596	.1640	.1438	.1460	.1227	.1279
9	.177-32	.1723	.1770	.1544	.1567	.1307	.1364
10	.190-30	.1852	.1900	.1660	.1684	.1407	.1467
12	.216-28	.2111	.2160	.1903	.1928	.1633	.1696
14	.242-24	.2368	.2420	.2123	.2149	.1807	.1879
16	.268-22	.2626	.2680	.2358	.2385	.2013	.2090
18	.294-20	.2884	.2940	.2587	.2615	.2208	.2290
20	.320-20	.3144	.3200	.2847	.2875	.2468	.2550
22	.346-18	.3402	.3460	.3070	.3099	.2649	.2738
24	.372-16	.3660	.3720	.3284	.3314	.2810	.2908
26	.398-16	.3920	.3980	.3544	.3574	.3070	.3168
28	.424-14	.4178	.4240	.3745	.3776	.3204	.3312
30	.450-14	.4438	.4500	.4005	.4036	.3464	.3572

# A. S. M. E. STANDARD.

## SPECIAL SCREWS.

NOTE:—Maximum sizes given are the standard sizes.

Basic Size		Outside Diameter		Pitch Diameter.		Root Diameter	
No.	O.D.—T.P.I.	Min.	Max.	Min.	Max.	Min.	Max.
1	.073-64	.0698	.0730	.0612	.0629	.0494	.0527
2	.086-56	.0825	.0860	.0727	.0744	.0591	.0628
3	.099-48	.0952	.0990	.0836	.0855	.0678	.0719
4	.112-40	.1078	.1120	.0937	.0958	.0747	.0795
	.112-36	.1076	.1120	.0918	.0940	.0707	.0759
5	.125-40	.1208	.1250	.1067	.1088	.0877	.0925
	.125-36	.1206	.1250	.1048	.1070	.0837	.0889
6	.138-36	.1336	.1380	.1178	.1200	.0967	.1019
	.138-32	.1333	.1380	.1154	.1177	.0917	.0974
7	.151-32	.1463	.1510	.1284	.1307	.1047	.1104
	.151-30	.1462	.1510	.1269	.1294	.1017	.1077
8	.164-32	.1593	.1640	.1414	.1437	.1177	.1234
	.164-30	.1592	.1640	.1399	.1423	.1147	.1207
9	.177-30	.1722	.1770	.1529	.1553	.1277	.1337
	.177-24	.1718	.1770	.1473	.1499	.1158	.1229
10	.190-32	.1853	.1900	.1674	.1697	.1437	.1494
	.190-24	.1848	.1900	.1603	.1629	.1287	.1359
12	.216-24	.2108	.2160	.1863	.1889	.1547	.1619
14	.242-20	.2364	.2420	.2067	.2095	.1688	.1770
16	.268-20	.2624	.2680	.2327	.2355	.1948	.2030
18	.294-18	.2882	.2940	.2550	.2579	.2129	.2218
20	.320-18	.3142	.3200	.2810	.2839	.2389	.2478
22	.346-16	.3400	.3460	.3024	.3054	.2550	.2648
24	.372-18	.3662	.3720	.3330	.3359	.2909	.2998
26	.398-14	.3918	.3980	.3485	.3516	.2944	.3052
28	.424-16	.4180	.4240	.3804	.3834	.3330	.3482
30	.450-16	.4440	.4500	.4064	.4094	.3590	.3688

## SIZES OF TAP DRILLS

FOR TAPS MADE BY

MORSE TWIST DRILL AND MACHINE COMPANY,

NEW BEDFORD, MASS.

## FOR TAPS WITH "V" THREAD.

Diam. Tap, in Ins.	Thds. per Inch.	Size of Drill, No.	Diam. Tap, in Ins.	Thds. per Inch.	Size of Drill.	Diam. Tap, in Ins.	Thds. per Inch.	Size of Drill, Ins.	Diam. Tap, in Ins.	Thds. per Inch.	Size of Drill, Ins.
$\frac{3}{32}$	48	50	$\frac{7}{32}$	24	No. 20	$\frac{19}{32}$	12	$\frac{31}{64}$	$\frac{1}{32}$	7	$\frac{1}{64}$
$\frac{1}{16}$	52	50	$\frac{1}{16}$	28	No. 17	$\frac{17}{32}$	14	$\frac{1}{2}$	$\frac{1}{32}$	8	$\frac{1}{64}$
$\frac{3}{32}$	54	49	$\frac{3}{32}$	30	No. 16	$\frac{5}{8}$	10	$\frac{31}{64}$	$\frac{1}{16}$	7	$\frac{3}{64}$
$\frac{3}{32}$	56	49	$\frac{3}{32}$	32	No. 15	$\frac{5}{8}$	11	$\frac{1}{2}$	$\frac{1}{32}$	7	$\frac{1}{64}$
$\frac{3}{32}$	60	48	$\frac{15}{64}$	24	No. 16	$\frac{5}{8}$	12	$\frac{33}{64}$	$\frac{1}{16}$	7	$\frac{1}{64}$
$\frac{3}{32}$	32	50	$\frac{63}{64}$	28	No. 12	$\frac{43}{64}$	10	$\frac{33}{64}$	$\frac{1}{32}$	7	$\frac{1}{64}$
$\frac{7}{64}$	36	49	$\frac{15}{64}$	32	No. 10	$\frac{43}{64}$	11	$\frac{47}{64}$	$\frac{1}{8}$	6	$\frac{1}{64}$
$\frac{7}{64}$	40	47	$\frac{1}{4}$	18	No. 17	$\frac{43}{64}$	12	$\frac{47}{64}$	$\frac{1}{32}$	6	$\frac{1}{64}$
$\frac{7}{64}$	48	44	$\frac{1}{4}$	20	No. 14	$\frac{17}{32}$	11	$\frac{17}{32}$	$\frac{1}{16}$	6	$\frac{1}{64}$
$\frac{7}{64}$	56	43	$\frac{1}{4}$	24	No. 9	$\frac{17}{32}$	12	$\frac{37}{64}$	$\frac{1}{16}$	6	$\frac{1}{64}$
$\frac{1}{8}$	32	44	$\frac{3}{32}$	16	No. 10	$\frac{43}{64}$	11	$\frac{43}{64}$	$\frac{1}{16}$	6	$\frac{1}{64}$
$\frac{1}{8}$	36	43	$\frac{3}{32}$	18	$\frac{13}{64}$ in.	$\frac{43}{64}$	12	$\frac{43}{64}$	$\frac{1}{16}$	6	$\frac{1}{64}$
$\frac{1}{8}$	40	42	$\frac{3}{32}$	20	No. 3	$\frac{3}{4}$	10	$\frac{43}{64}$	$\frac{1}{16}$	6	$\frac{1}{64}$
$\frac{1}{8}$	42	41	$\frac{9}{16}$	16	No. 1	$\frac{3}{4}$	11	$\frac{5}{8}$	$\frac{1}{32}$	6	$\frac{1}{64}$
$\frac{1}{8}$	48	39	$\frac{15}{16}$	18	$\frac{15}{64}$ in.	$\frac{3}{4}$	12	$\frac{47}{64}$	$\frac{1}{8}$	5	$\frac{1}{64}$
$\frac{9}{64}$	30	41	$\frac{11}{32}$	16	F in.	$\frac{41}{64}$	10	$\frac{15}{8}$	$\frac{1}{16}$	5½	$\frac{1}{64}$
$\frac{9}{64}$	32	40	$\frac{11}{32}$	18	$\frac{17}{64}$ in.	$\frac{41}{64}$	11	$\frac{15}{8}$	$\frac{1}{32}$	5	$\frac{1}{64}$
$\frac{9}{64}$	36	37	$\frac{3}{8}$	14	J	$\frac{41}{64}$	12	$\frac{41}{64}$	$\frac{1}{32}$	5½	$\frac{1}{64}$
$\frac{9}{64}$	40	34	$\frac{3}{8}$	16	L	$\frac{41}{64}$	10	$\frac{41}{64}$	$\frac{1}{16}$	5	$\frac{1}{64}$
$\frac{9}{64}$	30	33	$\frac{3}{8}$	18	$\frac{19}{64}$ in.	$\frac{41}{64}$	10	$\frac{41}{64}$	$\frac{1}{16}$	5½	$\frac{1}{64}$
$\frac{3}{16}$	32	32	$\frac{13}{32}$	14	N	$\frac{37}{64}$	9	$\frac{37}{64}$	$\frac{1}{32}$	5	$\frac{1}{64}$
$\frac{3}{16}$	36	31	$\frac{13}{32}$	16	P	$\frac{37}{64}$	10	$\frac{37}{64}$	$\frac{1}{32}$	5½	$\frac{1}{64}$
$\frac{3}{16}$	40	30	$\frac{13}{32}$	18	$\frac{21}{64}$ in.	$\frac{37}{64}$	9	$\frac{37}{64}$	$\frac{1}{16}$	5	$\frac{1}{64}$
$\frac{3}{16}$	32	30	$\frac{17}{64}$	14	R	$\frac{17}{32}$	9	$\frac{49}{64}$	$\frac{1}{32}$	5	$\frac{1}{64}$
$\frac{1}{4}$	36	29	$\frac{7}{16}$	16	S	$\frac{31}{64}$	9	$\frac{13}{16}$	$\frac{1}{16}$	5	$\frac{1}{64}$
$\frac{1}{4}$	40	28	$\frac{3}{8}$	14	$\frac{3}{8}$ W	1	8	$\frac{17}{32}$	$\frac{1}{32}$	5	$\frac{1}{64}$
$\frac{1}{4}$	24	29	$\frac{15}{32}$	16	W	$\frac{17}{32}$	8	$\frac{55}{64}$	$\frac{1}{16}$	4½	$\frac{1}{64}$
$\frac{3}{16}$	28	28	$\frac{1}{2}$	12	$\frac{25}{64}$ in.	$\frac{17}{16}$	8	$\frac{55}{64}$	$\frac{1}{8}$	5	$\frac{1}{64}$
$\frac{3}{16}$	30	27	$\frac{1}{2}$	13	X	$\frac{1}{32}$	8	$\frac{59}{64}$	$\frac{1}{32}$	4½	$\frac{1}{64}$
$\frac{3}{16}$	32	26	$\frac{1}{2}$	14	in.	$\frac{1}{8}$	7	$\frac{59}{64}$	$\frac{1}{32}$	5	$\frac{1}{64}$
$\frac{3}{16}$	36	24	$\frac{1}{2}$	12	in.	$\frac{1}{16}$	8	$\frac{59}{64}$	$\frac{1}{16}$	4½	$\frac{1}{64}$
$\frac{13}{64}$	24	26	$\frac{3}{32}$	13	in.	$\frac{1}{32}$	7	$\frac{61}{64}$	$\frac{1}{16}$	5	$\frac{1}{64}$
$\frac{13}{64}$	28	22	$\frac{3}{32}$	14	in.	$\frac{1}{32}$	8	$\frac{61}{64}$	$\frac{1}{32}$	4½	$\frac{1}{64}$
$\frac{13}{64}$	32	20	$\frac{9}{16}$	12	in.	$\frac{1}{16}$	7	$\frac{63}{64}$	$\frac{1}{32}$	5	$\frac{1}{64}$
$\frac{13}{64}$	36	18	$\frac{9}{16}$	14	in.	$\frac{1}{16}$	8	$\frac{63}{64}$	2	4½	$\frac{1}{64}$

## SIZES OF TAP DRILLS.

FOR TAPS WITH U. S. STANDARD THREADS.

Diam. Tap, in Ins.	Thds. per In.	Size of Drill.	Diam. Tap, in Ins.	Thds. per In.	Size of Drill, Ins.	Diam. Tap, in Ins.	Thds. per Inch.	Size of Drill, Ins.	Diam. Tap, in Ins.	Thds. per Inch.	Size of Drill, Ins.
$\frac{1}{4}$	20	$\frac{3}{16}$ in.	$\frac{11}{16}$	11	$\frac{37}{64}$	$1\frac{1}{4}$	7	$1\frac{5}{64}$	$2\frac{1}{8}$	$4\frac{1}{2}$	$1\frac{37}{64}$
$\frac{5}{16}$	18	C	$\frac{3}{4}$	10	$\frac{5}{8}$	$1\frac{3}{8}$	6	$1\frac{11}{64}$	$2\frac{1}{4}$	$4\frac{1}{2}$	$1\frac{33}{64}$
$\frac{3}{8}$	16	N	$\frac{13}{16}$	10	$\frac{11}{16}$	$1\frac{1}{2}$	6	$1\frac{13}{64}$	$2\frac{3}{8}$	4	$2\frac{1}{16}$
$\frac{7}{16}$	14	S	$\frac{7}{8}$	9	$\frac{47}{64}$	$1\frac{5}{8}$	$5\frac{1}{2}$	$1\frac{25}{64}$	$2\frac{1}{2}$	4	$2\frac{1}{16}$
$\frac{1}{2}$	13	$\frac{13}{16}$ in.	$\frac{15}{16}$	9	$\frac{51}{64}$	$1\frac{3}{4}$	5	$1\frac{1}{2}$			
$\frac{9}{16}$	12	$\frac{29}{64}$ in.	1	8	$\frac{63}{64}$	$1\frac{7}{8}$	5	$1\frac{5}{8}$			
$\frac{5}{8}$	11	$\frac{33}{64}$ in.	$1\frac{1}{8}$	7	$\frac{61}{64}$	2	$4\frac{1}{2}$	$1\frac{33}{64}$			

## FOR MACHINE SCREW TAPS.

Size of Tap, Number.	Size of Drill, Number.	Size of Tap, Number.	Size of Drill, Number.	Size of Tap, Number.	Size of Drill, Number.	Size of Tap, Number.	Size of Drill, Number.
2 x 48	50	7 x 32	30	13 x 20	15	18 x 20	A
2 x 56	49	8 x 24	30	13 x 22	15	19 x 16	B
2 x 64	48	8 x 30	30	13 x 24	13	19 x 18	C
3 x 40	47	8 x 32	29	14 x 20	13	19 x 20	D
3 x 48	45	9 x 24	29	14 x 22	11	20 x 16	D
3 x 56	44	9 x 28	28	14 x 24	9	20 x 18	F
4 x 32	43	9 x 30	27	15 x 18	10	20 x 20	H
4 x 36	42	9 x 32	25	15 x 20	8	22 x 16	J
4 x 40	41	10 x 24	25	15 x 22	6	22 x 18	L
5 x 30	40	10 x 30	22	15 x 24	5	24 x 14	M
5 x 32	40	10 x 32	21	16 x 16	7	24 x 16	N
5 x 36	38	11 x 24	21	16 x 18	6	24 x 18	O
5 x 40	37	11 x 28	17	16 x 20	5	26 x 14	O
6 x 30	35	11 x 30	17	17 x 16	6	26 x 16	P
6 x 32	35	12 x 20	19	17 x 18	2	28 x 14	R
6 x 36	33	12 x 22	17	17 x 20	2	28 x 16	S
6 x 40	32	12 x 24	17	18 x 16	2	30 x 14	U
7 x 28	32	12 x 28	15	18 x 18	1	30 x 16	V
7 x 30	31						

For Steel work use one or two sizes of drills larger than listed above.

## SIZES OF DRILLS FOR PIPE TAPS.

BRIGGS' STANDARD.

Reamers should be used for the larger sizes.

$\frac{1}{8}$ — $\frac{11}{32}$	$\frac{3}{8}$ — $\frac{27}{32}$	$\frac{3}{4}$ — $\frac{23}{32}$	$1\frac{1}{4}$ — $1\frac{1}{2}$	2 — $2\frac{3}{16}$	3— $3\frac{1}{4}$
$\frac{1}{4}$ — $\frac{7}{16}$	$\frac{1}{2}$ — $\frac{45}{64}$	1 — $1\frac{9}{64}$	$1\frac{1}{2}$ — $1\frac{33}{64}$	$2\frac{1}{2}$ — $2\frac{5}{8}$	

## TAP DRILLS,

## FOR MACHINE SCREW TAPS.

## A. S. M. E. STANDARD.

The diameter given for each hole to be tapped allows for a practical clearance at the root of the thread of the screw and will not impose undue strain upon the tap in service.

Size of Tap.	Number of Threads.	Size of Drill.	Size of Tap.	Number of Threads.	Size of Drill.
0	80	.0465	9	32	.1405
1	64	.055	10	24	.140
1	72	.0595	10	30	.152
2	56	.0670	10	32	.154
2	64	.070	12	24	.166
3	48	.076	12	28	.173
3	56	.0785	14	20	.182
4	36	.080	14	24	.1935
4	40	.082	16	20	.209
4	48	.089	16	22	.213
5	36	.0935	18	18	.228
5	40	.098	18	20	.234
5	44	.0995	20	18	.257
6	32	.1015	20	20	.261
6	36	.1065	22	16	.272
6	40	.110	22	18	.281
7	30	.113	24	16	.295
7	32	.116	24	18	.302
7	36	.120	26	14	.316
8	30	.1285	26	16	.323
8	32	.1285	28	14	.339
8	36	.136	28	16	.348
9	24	.1285	30	14	.368
9	30	.136	30	16	.377

## SUGGESTIONS FOR ORDERING CUTTERS.

**REGULAR CUTTERS.**—Always order by catalogue number giving diameter, face and size of hole.

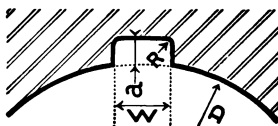
**SPECIAL MILLING CUTTERS.**—Give diameter, face, size of hole and keyway and refer to catalogue number for style. When End Mills, Angular Mills, Facing Mills and T Slot Cutters are desired, be particular to state whether **RIGHT OR LEFT HAND**.

**FORMED CUTTERS.**—Sketches showing form and all dimensions, or template showing form together with all dimensions should be furnished when ordering Formed Cutters. Also state whether Cutter is “coming” or “going” at the bottom. Formed Cutters are adopted for work where uniformity is required, and are sharpened by grinding the faces of the teeth.

**GEAR CUTTERS.**—Give number of cutter and diametral pitch when ordering. Diametral pitch means the number of teeth to the inch in diameter in pitch circle of any wheel. These cutters are sharpened by grinding the faces of the teeth.

To get best results be sure Cutters are **KEPT SHARP**.

## STANDARD KEYWAY FOR CUTTERS.



Diameter (D), Inches	Width (W), Inches.	Depth (a), Inches.	Radius (R), Inches
$\frac{3}{8}$ to $\frac{5}{16}$	$\frac{3}{32}$	$\frac{3}{64}$	.020
$\frac{5}{8}$ to $\frac{7}{8}$	$\frac{1}{8}$	$\frac{1}{16}$	.030
$\frac{15}{16}$ to $1\frac{1}{8}$	$\frac{5}{32}$	$\frac{5}{64}$	.035
$1\frac{3}{16}$ to $1\frac{3}{8}$	$\frac{3}{16}$	$\frac{3}{32}$	.040
* $1\frac{7}{16}$ to $1\frac{3}{4}$	$\frac{1}{4}$	$\frac{1}{8}$	.050
* $1\frac{13}{16}$ to 2	$\frac{5}{16}$	$\frac{5}{32}$	.060
$2\frac{1}{16}$ to $2\frac{1}{2}$	$\frac{3}{8}$	$\frac{1}{8}$	.060
$2\frac{9}{16}$ to 3	$\frac{7}{16}$	$\frac{7}{16}$	.060

\* All Gear Cutters with holes  $1\frac{1}{2}$ , 1 $\frac{3}{4}$ , and 2 inches diameter have Keyways for  $\frac{1}{16}$ ,  $\frac{3}{16}$ , and  $\frac{1}{2}$  inch Keys respectively.



## MILLING CUTTERS.

TABLE OF CUTTING SPEEDS.

Diam. Inches.	FEET PER MINUTE.					Diam. Inches.	FEET PER MINUTE.				
	5	10	15	20	25		5	10	15	20	25
REVOLUTIONS PER MINUTE.	REVOLUTIONS PER MINUTE.					REVOLUTIONS PER MINUTE.					
$\frac{1}{2}$	38.2	76.4	114.6	152.9	191.1	8	2.4	4.8	7.2	9.6	11.9
$\frac{5}{8}$	30.6	61.2	91.8	122.5	153.1	9	2.1	4.2	6.4	8.5	10.6
$\frac{3}{4}$	25.4	50.8	76.3	101.7	127.1	10	1.9	3.8	5.7	7.6	9.6
$\frac{7}{8}$	21.8	43.6	65.5	87.3	109.1	11	1.7	3.5	5.2	6.9	8.7
1	19.1	38.2	57.3	76.4	95.5	12	1.6	3.2	4.8	6.4	8.0
$1\frac{1}{8}$	17.0	34.0	51.0	68.0	85.0	13	1.5	2.9	4.4	5.9	7.3
$1\frac{1}{4}$	15.3	30.6	45.8	61.2	76.3	14	1.4	2.7	4.1	5.5	6.8
$1\frac{3}{8}$	13.9	27.8	41.7	55.6	69.5	15	1.3	2.5	3.8	5.1	6.4
$1\frac{1}{2}$	12.7	25.4	38.2	50.8	63.7	16	1.2	2.4	3.6	4.8	6.0
$1\frac{5}{8}$	11.8	23.5	35.0	47.0	58.8	17	1.1	2.2	3.4	4.5	5.6
$1\frac{3}{4}$	10.9	21.8	32.7	43.6	54.5	18	1.1	2.1	3.2	4.2	5.3
$1\frac{7}{8}$	10.2	20.4	30.6	40.7	50.9	19	1.0	2.0	3.0	4.0	5.0
2	9.6	19.1	28.7	38.2	47.8	20	1.0	1.9	2.9	3.8	4.8
$2\frac{1}{4}$	8.5	17.0	25.4	34.0	42.4	21	.9	1.8	2.7	3.6	4.5
$2\frac{1}{2}$	7.6	15.3	22.9	30.6	38.2	22	.9	1.7	2.6	3.5	4.3
$2\frac{3}{4}$	6.9	13.9	20.8	27.8	34.7	23	.8	1.7	2.5	3.3	4.1
3	6.4	12.7	19.1	25.5	31.8	24	.8	1.6	2.4	3.2	4.0
$3\frac{1}{2}$	5.5	10.9	16.4	21.8	27.3	25	.8	1.5	2.3	3.1	3.8
4	4.8	9.6	14.3	19.1	23.9	26	.7	1.5	2.2	2.9	3.7
$4\frac{1}{2}$	4.2	8.5	12.7	16.9	21.2	27	.7	1.4	2.1	2.8	3.5
5	3.8	7.6	11.5	15.3	19.1	28	.7	1.4	2.0	2.7	3.4
$5\frac{1}{2}$	3.5	6.9	10.4	13.9	17.4	29	.7	1.3	2.0	2.6	3.3
6	3.2	6.4	9.6	12.7	15.9	30	.6	1.3	1.9	2.5	3.2
7	2.7	5.5	8.1	10.9	13.6						

The above table will be convenient for finding the number of revolutions per minute required to give a periphery speed from 5 to 50 feet per minute of diameters from  $\frac{1}{2}$  to 30 inches.

EXAMPLES.—A mill 2 inches in diameter, to have a periphery speed of 35 feet per minute, should make about 67 revolutions, while a  $1\frac{1}{8}$  inch mill should make 120 revolutions to have the same periphery speed. If a  $\frac{3}{4}$  inch mill makes 250 revolutions per minute, the periphery speed is about 50 feet.

Continued on next page.

## MILLING CUTTERS—CONTINUED.

TABLE OF CUTTING SPEEDS.

Diam. Inches	FEET PER MINUTE.					Diam. Inches	FEET PER MINUTE.				
	30	35	40	45	50		30	35	40	45	50
	REVOLUTIONS PER MINUTE						REVOLUTIONS PER MINUTE				
$\frac{1}{2}$	229.3	267.5	305.7	344.0	382.2	8	14.3	16.7	19.1	21.1	23.9
$\frac{5}{8}$	183.7	214.3	244.9	275.5	306.1	9	12.7	14.9	17.0	19.1	21.2
$\frac{3}{4}$	152.5	178.0	203.4	228.8	254.2	10	11.5	13.4	15.3	17.2	19.1
$\frac{7}{8}$	130.9	152.7	174.5	196.3	218.9	11	10.4	12.2	13.9	15.6	17.4
1	114.6	133.8	152.9	172.0	191.1	12	9.6	11.1	12.7	14.3	15.9
$1\frac{1}{8}$	102.0	119.0	136.0	153.0	170.0	13	8.8	10.3	11.8	13.2	14.7
$1\frac{1}{4}$	91.8	106.9	122.5	137.4	153.1	14	8.1	9.6	10.9	12.3	13.6
$1\frac{3}{8}$	83.3	97.2	111.1	125.0	138.9	15	7.6	8.9	10.2	11.5	12.7
$1\frac{1}{2}$	76.3	89.2	101.7	114.6	127.1	16	7.2	8.4	9.6	10.7	11.9
$1\frac{5}{8}$	70.5	82.2	93.9	105.7	117.4	17	6.7	7.9	9.0	10.1	11.2
$1\frac{3}{4}$	65.5	76.4	87.3	98.2	109.1	18	6.4	7.4	8.5	9.6	10.6
$1\frac{7}{8}$	61.1	71.3	81.5	91.9	101.9	19	6.0	7.0	8.0	9.1	10.1
2	57.3	66.9	76.4	86.0	95.5	20	5.7	6.7	7.6	8.6	9.6
$2\frac{1}{4}$	51.0	59.4	68.0	76.2	85.0	21	5.5	6.4	7.3	8.1	9.1
$2\frac{1}{2}$	45.8	53.5	61.2	68.8	76.3	22	5.2	6.1	6.9	7.8	8.7
$2\frac{3}{4}$	41.7	48.6	55.6	62.5	69.5	23	5.0	5.8	6.6	7.5	8.3
3	38.2	44.6	51.0	57.3	63.7	24	4.8	5.6	6.4	7.2	8.0
$3\frac{1}{2}$	32.7	38.2	43.6	49.1	54.5	25	4.6	5.3	6.1	6.9	7.6
4	28.7	33.4	38.2	43.0	47.8	26	4.4	5.1	5.9	6.6	7.3
$4\frac{1}{2}$	25.4	29.6	34.0	38.1	42.4	27	4.2	5.0	5.7	6.4	7.1
5	22.9	26.7	30.6	34.4	38.2	28	4.1	4.8	5.5	6.1	6.8
$5\frac{1}{2}$	20.8	24.3	27.8	31.3	34.7	29	4.0	4.6	5.3	5.9	6.6
6	19.1	22.3	25.5	28.7	31.8	30	3.8	4.5	5.1	5.7	6.4
7	16.4	19.1	21.8	24.6	27.3						

The above table will be convenient for finding the number of revolutions per minute required to give a periphery speed from 5 to 50 feet per minute of diameters from  $\frac{1}{2}$  to 30 inches.

EXAMPLES.—A mill 2 inches in diameter, to have a periphery speed of 35 feet per minute, should make about 67 revolutions, while a  $1\frac{1}{8}$  inch mill should make 120 revolutions to have the same periphery speed. If a  $\frac{3}{4}$  inch mill makes 250 revolutions per minute, the periphery speed is about 50 feet.

# WEIGHTS OF SQUARE AND ROUND BARS OF WROUGHT IRON.

IN POUNDS PER LINEAR FOOT.

IRON WEIGHING 480 LBS. PER CUBIC FOOT. FOR STEEL ADD 2 PER CENT.  
TAKEN FROM KENT'S MECHANICAL ENGINEERS' POCKET-BOOK.

Thickness or Diameter in Inches.	Weight of Square Bar One Foot Long.	Weight of Round Bar One Foot Long.	Thickness or Diameter in Inches.	Weight of Square Bar One Foot Long.	Weight of Round Bar One Foot Long.
0					
$\frac{1}{16}$	.013	.010	$2\frac{1}{2}$	20.83	16.36
$\frac{1}{8}$	.052	.041	$\frac{9}{16}$	21.89	17.19
$\frac{3}{16}$	.117	.092	$\frac{5}{8}$	22.97	18.04
$\frac{1}{4}$	.208	.164	$\frac{11}{16}$	24.08	18.91
$\frac{5}{16}$	.326	.256	$\frac{3}{4}$	25.21	19.80
$\frac{3}{8}$	.469	.368	$\frac{13}{16}$	26.37	20.71
$\frac{7}{16}$	.638	.501	$\frac{7}{8}$	27.55	21.64
$\frac{1}{2}$	.833	.654	$\frac{15}{16}$	28.76	22.59
$\frac{9}{16}$	1.055	.828	3	30.00	23.56
$\frac{5}{8}$	1.302	1.023	$\frac{1}{16}$	31.26	24.55
$\frac{11}{16}$	1.576	1.237	$\frac{1}{8}$	32.55	25.57
$\frac{3}{4}$	1.875	1.473	$\frac{3}{16}$	33.87	26.60
$\frac{13}{16}$	2.201	1.728	$\frac{1}{4}$	35.21	27.65
$\frac{7}{8}$	2.552	2.004	$\frac{5}{16}$	36.58	28.73
$\frac{15}{16}$	2.930	2.301	$\frac{3}{8}$	37.97	29.82
1	3.333	2.618	$\frac{7}{16}$	39.39	30.94
$\frac{1}{8}$	3.763	2.955	$\frac{1}{2}$	40.83	32.07
$\frac{1}{8}$	4.219	3.313	$\frac{9}{16}$	42.30	33.23
$\frac{3}{16}$	4.701	3.692	$\frac{5}{8}$	43.80	34.40
$\frac{1}{4}$	5.208	4.091	$\frac{11}{16}$	45.33	35.60
$\frac{5}{16}$	5.742	4.510	$\frac{3}{4}$	46.88	36.82
$\frac{3}{8}$	6.302	4.950	$\frac{13}{16}$	48.45	38.05
$\frac{7}{16}$	6.888	5.410	$\frac{7}{8}$	50.05	39.31
$\frac{1}{2}$	7.500	5.890	$\frac{15}{16}$	51.68	40.59
$\frac{9}{16}$	8.138	6.392	4	53.33	41.89
$\frac{5}{8}$	8.802	6.913	$\frac{1}{16}$	55.01	43.21
$\frac{11}{16}$	9.492	7.455	$\frac{1}{8}$	56.72	44.55
$\frac{3}{4}$	10.21	8.018	$\frac{3}{16}$	58.45	45.91
$\frac{13}{16}$	10.95	8.601	$\frac{1}{4}$	60.21	47.29
$\frac{7}{8}$	11.72	9.204	$\frac{5}{16}$	61.99	48.69
$\frac{15}{16}$	12.51	9.828	$\frac{3}{8}$	63.80	50.11
2	13.33	10.47	$\frac{7}{16}$	65.64	51.55
$\frac{1}{8}$	14.18	11.14	$\frac{1}{2}$	67.50	53.01
$\frac{1}{8}$	15.05	11.82	$\frac{9}{16}$	69.39	54.50
$\frac{3}{16}$	15.95	12.53	$\frac{5}{8}$	71.30	56.00
$\frac{1}{4}$	16.88	13.25	$\frac{11}{16}$	73.24	57.52
$\frac{5}{16}$	17.83	14.00	$\frac{3}{4}$	75.21	59.07
$\frac{3}{8}$	18.80	14.77	$\frac{13}{16}$	77.20	60.63
$\frac{7}{16}$	19.80	15.55	$\frac{7}{8}$	79.22	62.22

## WEIGHTS OF SQUARE AND ROUND BARS OF WROUGHT IRON

IN POUNDS PER LINEAR FOOT—CONTINUED.  
IRON WEIGHING 480 LBS. PER CUBIC FOOT. FOR STEEL ADD 2 PER CENT.

Thickness or Diameter in Inches	Weight of Square Bar One Foot Long	Weight of Round Bar One Foot Long	Thickness or Diameter in Inches	Weight of Square Bar One Foot Long	Weight of Round Bar One Foot Long
$4\frac{1}{16}$	81.26	63.82	7	163.3	128.3
5	83.33	65.45	$\frac{1}{8}$	169.2	132.9
$\frac{1}{16}$	85.43	67.10	$\frac{1}{4}$	175.2	137.6
$\frac{1}{8}$	87.55	68.76	$\frac{3}{8}$	181.3	142.4
$\frac{1}{16}$	89.70	70.45	$\frac{1}{2}$	187.5	147.3
$\frac{1}{4}$	91.88	72.16	$\frac{5}{8}$	193.8	152.2
$\frac{1}{16}$	94.08	73.89	$\frac{3}{4}$	200.2	157.2
$\frac{3}{8}$	96.30	75.64	$\frac{7}{8}$	206.7	162.4
$\frac{1}{16}$	98.55	77.40	8	213.3	167.6
$\frac{1}{2}$	100.8	79.19	$\frac{1}{4}$	226.9	178.2
$\frac{9}{16}$	103.1	81.00	$\frac{1}{2}$	240.8	189.2
$\frac{5}{8}$	105.5	82.83	$\frac{3}{4}$	255.2	200.4
$\frac{11}{16}$	107.8	84.69	9	270.0	212.1
$\frac{3}{4}$	110.2	86.56	$\frac{1}{4}$	285.2	224.0
$\frac{13}{16}$	112.6	88.45	$\frac{1}{2}$	300.8	236.3
$\frac{7}{8}$	115.1	90.36	$\frac{3}{4}$	316.9	248.9
$\frac{15}{16}$	117.5	92.29	10	333.3	261.8
6	120.0	94.25	$\frac{1}{4}$	350.2	275.1
$\frac{1}{8}$	125.1	98.22	$\frac{1}{2}$	367.5	288.6
$\frac{1}{4}$	130.2	102.3	$\frac{3}{4}$	385.2	302.5
$\frac{3}{8}$	135.5	106.4	11	403.3	316.8
$\frac{1}{2}$	140.8	110.6	$\frac{1}{4}$	421.9	331.3
$\frac{5}{8}$	146.3	114.9	$\frac{1}{2}$	440.8	346.2
$\frac{3}{4}$	151.9	119.3	$\frac{3}{4}$	460.2	361.4
$\frac{7}{8}$	157.6	123.7	12	480.0	377.0

## LUBRICANTS FOR CUTTING TOOLS.

Material	Turning	Chucking	Drilling Milling	Reaming	Tapping
Tool Steel	Dry or Oil	Oil or Soda Water	Oil	Lard Oil	Oil
Soft Steel	Dry or Soda Water	Soda Water	Oil or Soda Water	Lard Oil	Oil
Wrought Iron	Dry or Soda Water	Soda Water	Oil or Soda Water	Lard Oil	Oil
Cast Iron	Dry	Dry	Dry	Dry	Oil
Brass	Dry	Dry	Dry	Dry	Oil
Copper	Dry	Oil	Oil	Mixture	Oil
Babbitt	Dry	Dry	Dry	Dry	Oil
Glass			Turpentine	or Kerosene	

Mixture is  $\frac{1}{3}$  Crude Petroleum,  $\frac{2}{3}$  Lard Oil. Oil is Lard. When two lubricants are mentioned the first is preferable.

## WEIGHT OF IRON AND STEEL SHEETS.

WEIGHTS PER SQUARE FOOT.

TAKEN FROM KENT'S MECHANICAL ENGINEERS' POCKET-BOOK.

THICKNESS BY BIRMINGHAM GAUGE.				THICKNESS BY AMERICAN (B. & S.) GAUGE.			
Number of Gauge.	Thickness in Inches.	Iron.	Steel.	Number of Gauge.	Thickness in Inches.	Iron.	Steel.
0000	.454	18.16	18.52	0000	.46	18.40	18.77
000	.425	17.00	17.34	000	.4096	16.38	16.71
00	.38	15.20	15.50	00	.3648	14.59	14.88
0	.34	13.60	13.87	0	.3249	13.00	13.26
1	.3	12.00	12.24	1	.2893	11.57	11.80
2	.284	11.36	11.59	2	.2576	10.30	10.51
3	.259	10.36	10.57	3	.2294	9.18	9.36
4	.233	9.52	9.71	4	.2043	8.17	8.34
5	.22	8.80	8.98	5	.1819	7.28	7.42
6	.203	8.12	8.28	6	.1620	6.48	6.61
7	.18	7.20	7.34	7	.1443	5.77	5.89
8	.165	6.60	6.73	8	.1285	5.14	5.24
9	.148	5.92	6.04	9	.1144	4.58	4.67
10	.134	5.36	5.47	10	.1019	4.08	4.16
11	.12	4.80	4.90	11	.0907	3.63	3.70
12	.109	4.36	4.45	12	.0808	3.23	3.30
13	.095	3.80	3.88	13	.0720	2.88	2.94
14	.083	3.32	3.39	14	.0641	2.56	2.62
15	.072	2.88	2.94	15	.0571	2.28	2.33
16	.065	2.60	2.65	16	.0508	2.03	2.07
17	.058	2.32	2.37	17	.0453	1.81	1.85
18	.049	1.96	2.00	18	.0403	1.61	1.64
19	.042	1.68	1.71	19	.0359	1.44	1.46
20	.035	1.40	1.43	20	.0320	1.28	1.31
21	.032	1.28	1.31	21	.0285	1.14	1.16
22	.028	1.12	1.14	22	.0253	1.01	1.03
23	.025	1.00	1.02	23	.0226	.904	.922
24	.022	.88	.898	24	.0201	.804	.820
25	.02	.80	.816	25	.0179	.716	.730
26	.018	.72	.734	26	.0159	.636	.649
27	.016	.64	.653	27	.0142	.568	.579
28	.014	.56	.571	28	.0126	.504	.514
29	.013	.52	.530	29	.0113	.452	.461
30	.012	.48	.490	30	.0100	.400	.408
31	.01	.40	.408	31	.0089	.356	.363
32	.009	.36	.367	32	.0080	.320	.326
33	.008	.32	.326	33	.0071	.284	.290
34	.007	.28	.286	34	.0063	.252	.257
35	.005	.20	.204	35	.0056	.224	.228

	Iron	Steel
Specific Gravity . . . . .	7.7	7.854
Weight per Cubic Foot . . . . .	480.	489.6
Weight per Cubic Inch . . . . .	.2778	.2833

As there are many gauges in use differing from each other, and even the thicknesses of a certain specified gauge, as the Birmingham, are not assumed the same by all manufacturers, orders for sheets and wires should always state the weight per square foot, or the thickness in thousandths of an inch.

## WHAT IS MEANT BY "INCREASE TWIST?"

In order that a drill may be of sufficient strength to resist the torsional strain to which it is subjected in use, without being at the same time so thick at the point as to require excessive force to make it penetrate the work, it has long been customary to form the grooves of gradually decreasing depth from the point to the shank. By this practice the groove is naturally of less area near the shank and if no means were employed to increase this area there would be a tendency for the chips to clog in the groove.

This difficulty is obviated in the "Increase Twist" drill by gradually increasing the rate of forward traverse of the drill while it is fed to the groove milling cutters, the speed of rotation of the drill remaining constant. Through the ensuing change in the angle of the cutters to the groove, the groove is made wider and its area thereby increased.

---

## WHAT IS MEANT BY "CONSTANT ANGLE?"

In the "Constant Angle" drill the increase of area of groove toward the shank is obtained by a gradual variation of the angle of the cutters to the axis of the drill as the groove is milled, a uniform speed of rotation of the drill being maintained to produce a groove of uniform pitch. This variation widens the groove toward the shank of the drill, and compensates for the reduction of area, which would otherwise result from its diminishing depth, without impairing the efficiency of the cutting lip of the drill at any point by changing the pitch of the groove.

By this means any desired proportion of area of the groove at the point and at the shank can be obtained, the fact remaining that in any form of twist drill the more the groove is enlarged toward the shank the greater the extent to which the torsional strength of the drill is impaired.

In the "Constant Angle" drills the contour, angle, and area of the groove at all parts of its length are proportioned to combine the maximum torsional strength, the most efficient chip clearance, and the best form of cutting lip.









$$2 \frac{5}{16}$$

$$2.3125$$

$$.05191$$

---


$$23125$$

$$208125$$

$$23125$$

$$115625$$


---


$$126041875$$